

P.C. Rossin College of Engineering and Applied Science

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The P.C. Rossin College of Engineering and Applied Science offers the bachelor of science degree in 17 programs, combining a strong background in sciences and mathematics with requirements in humanities and social sciences. Students in college programs learn principles they can apply immediately in professional work; those who plan on further academic experience can design a curriculum centering on interests they will pursue in graduate school.

The mission of the college is to prepare undergraduate and graduate students to be critical thinkers, problem solvers, innovators, leaders and life-long learners in a global society and to create an environment where students pursue cutting-edge research in engineering and engineering science.

MAJOR PROGRAMS

The P.C. Rossin College of Engineering and Applied Science includes seven departments and offers undergraduate and graduate degree programs at the bachelor, master, and doctor of philosophy levels.

The undergraduate degree programs leading to the bachelor of science degree are:

- Applied Science (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/appliedscience>)
- Bioengineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/bioengineeringprogram>)¹
- Chemical Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/chemicalengineering>)¹
- Chemistry (<http://catalog.lehigh.edu/coursesprogramsandcurricula/artsandsciences/chemistry>)
- Civil Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/civilandenvironmentalengineering>)¹
- Computer Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/computerengineering>)¹
- Computer Science (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/computerscienceandengineering>)²
- Computer Science And Business (<http://catalog.lehigh.edu/coursesprogramsandcurricula/interdisciplinaryundergraduatestudy/computerscienceandbusinessprogram>)³
- Electrical Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/electricalandcomputerengineering>)¹
- Engineering Mechanics (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/mechanicalengineeringandmechanics>)
- Engineering Physics (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/electricalengineeringandengineeringphysics>)
- Environmental Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/civilandenvironmentalengineering>)¹
- Industrial & Systems Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/industrialandsystemsengineering>)
- Integrated Business And Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/interdisciplinaryundergraduatestudy/integratedbusinessengineering>)⁴

- Integrated Degree In Engineering, Arts And Sciences (<http://catalog.lehigh.edu/coursesprogramsandcurricula/interdisciplinaryundergraduatestudy/ideas>)
- Materials Science And Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/materialsscienceandengineering>)¹
- Mechanical Engineering (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/mechanicalengineeringandmechanics>)¹

¹ Accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>

² Accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org>

³ Accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org> and AACSB, the Association to Advance Collegiate Schools of Business

⁴ Accredited by AACSB, the Association to Advance Collegiate Schools of Business

Programs in chemistry and physics have been approved by the faculty program review committee in these disciplines.

FIRST YEAR COURSES FOR ENGINEERING DEGREES

First Year			
First Semester	CR	Second Semester	CR
ENGL 001	3	ENGL 002	3
MATH 021	4	MATH 022	4
ENGR 005	2	Select one of the following:	5-6
Select one of the following:	5-6	CHM 030 & ENGR 010	6
CHM 030 & ENGR 010	6	PHY 011 & PHY 012	5
PHY 011 & PHY 012	5	HSS Elective	3-4
			15-17
14-15			15-17

Total Credits: 29-32

Bioengineering students take CHM 030 and ENGR 010 in the fall along with BIOE 001 instead of ENGR 005. In the spring they take BIOS 041 (instead of HSS elective) along with PHY 011/PHY 012. The HSS elective is pushed to later semesters. Students in Computer Science and Business, Integrated Business and Engineering, and Integrated Degree in Engineering, Arts and Sciences follow a different first year curriculum.

MINIMUM HUMANITIES/SOCIAL SCIENCES (HSS) REQUIREMENTS FOR ALL ENGINEERING PROGRAMS

Basic Requirement

Economics and English. Three courses totaling a minimum of ten credit hours: Students must complete all three:

ECO 001	Principles of Economics	4
ENGL 001 or ENGL 003	Critical Reading and Composition Composition and Literature I for International Writers	3
ENGL 002 or ENGL 005	Research and Argument Composition and Literature II for International Writers	3
or ENGL 011	Seminar in Critical Reading & Writing	
Note: ENGL 011 is only for students with AP credit for ENGL 001		

Total Credits 10

Advanced Requirement

A minimum of four multi-credit courses and a minimum of 13 credits in courses designated as HU (humanities) or SS (social science), with the following restrictions:

1. Depth: At least eight credits must be in a common discipline and from the same department or program. At least three of these credits must be at the 100-level or above, or at the intermediate level or above for a single modern foreign language.
2. Breadth: At least three credits in a discipline different from, and not cross-listed with, the discipline employed to satisfy the depth requirement.
3. At least three credits must be designated as HU.
4. None of the courses used for HSS can be taken Pass/Fail.
5. None of the course can be one-credit courses.

FREE ELECTIVES

The college, through its advisers, is prepared to help students to use the credit hours of "free electives" that, along with other electives in the curriculum, may be used to develop a program of personal interest. Free electives may be satisfied by taking regular course offerings or up to six credit hours from each of the following from Mus 21-79, from Jour 1-8, or up to six credit hours of advanced ROTC courses.

INTERDISCIPLINARY DEGREES**Computer science & business**

The College of Business and Economics and the Computer Science and Engineering department in the P.C. Rossin College of Engineering and Applied Science jointly offer the Computer Science and Business (CSB) program. It is a four-year program that is fully accredited by AACSB International, the Association to Advance Collegiate Schools of Business, and by the Computing Accreditation Commission of ABET, <http://www.abet.org>.

Integrated Business & Engineering Honors Program

The Integrated Business and Engineering Honors Program (IBE) is offered jointly by the P.C. Rossin College of Engineering and Applied Science and the College of Business and Economics. The program recognizes the need for today's leaders in business and industry to have a sound foundation in both commerce and technology.

After four years and a minimum of 137 credits, students will receive a single Bachelor of Science Degree in Integrated Business and Engineering. The program meets the accreditation standards of the American Assembly of Collegiate Schools of Business. Students are expected to maintain a minimum GPA of 3.25 in order to remain in the program.

A second option is the five-year dual degree program. This option allows students to obtain a second Bachelor of Science degree in engineering by completing course work in the engineering field chosen by the student as their IBE major. Students enrolled in the four year IBE Honors Program and in satisfactory standing are able to transfer to a dual-degree at any time, and stay within the honors program cohort. The additional time necessary to complete the second degree will depend on the curriculum selected, and the number of advanced placement credits. The number of additional credit hours will typically be in the range of 20 to 30.

Students in the IBE Honors Program can major in nearly any area of engineering or business that Lehigh offers. After their freshman year, each student will declare a major in either the P. C. Rossin College of Engineering and Applied Science or the College of Business and Economics.

Admission to the Integrated Business and Engineering Program is highly selective, with annual admission limited to approximately 50 students. The University's Office of Admissions can explain the procedure for applying to the program. It is possible that a small number of exceptional students may be admitted to the program following the completion of their freshman year. Admission at this point would be highly competitive and based upon freshman year GPA, faculty recommendations, and space availability.

The Co-Directors of the IBE Honors Program are Robert H. Storer, Professor of Industrial and Systems Engineering (rhs2@lehigh.edu)

and Stephen G. Buell, Professor of Finance (sgb2@lehigh.edu). For additional information, see the IBE Honors Program or visit the IBE web site at www.lehigh.edu/~inibep/inibep.html.

Integrated Degree Engineering, Arts and Sciences (IDEAS) Honors Program

The B.S. in Integrated Engineering, Arts and Sciences (IDEAS) provides students with a unique opportunity to combine the breadth and depth of two focus areas, one from engineering and one from arts and sciences in a four-year experience. More information is available in the IDEAS entry in this catalog, or online at www.lehigh.edu/ideas.

Jointly administered by the College of Arts and Sciences and the P.C. Rossin College of Engineering and Applied Science, IDEAS is a four-year honors program that allows students to earn a bachelor's degree with concentrations in both colleges. In close collaboration with IDEAS advisors and faculty directors, students admitted to this highly selective honors program develop an individualized academic plan tailored to their interests.

IDEAS allows students to study diverse interests such as bioengineering and religion, computer science and graphic design, industrial engineering and international relations, bioengineering and molecular biology, and music and computer science. Key features of the program include:

- **Rigorous honors program:** Each year, IDEAS accepts 30-40 highly qualified first-year student candidates who have indicated an interest in the program. Students must maintain a 3.25 grade point average to continue.
- **Team-based and individual projects:** Each student builds toward a capstone research project and thesis in their senior year, developed through a combination of team-based and individualized instruction.
- **Communication as key to bridging disciplines:** IDEAS courses are writing-intensive and presentation-oriented. Participation in the program substitutes for some first-year courses in both colleges.

IDEAS graduates are awarded a Bachelor of Science degree, conferred by both colleges. Students interested in pursuing a professionally accredited degree in their selected engineering disciplines may choose to do so in an optional fifth year of study. Some programs of study in the College of Arts and Sciences, mainly in the sciences, may also require further study to complete certification.

OTHER OPTIONS FOR ENGINEERING STUDENTS**Cooperative Education (Co-Op)**

Co-Op is available for undergraduates in the P.C. Rossin College of Engineering and Applied Science; the program provides eight months of paid, full-time work experience, bridging the gap between engineering theory and application and allowing students to graduate within a four year time-frame. Because of the rigorous academic schedule, the program is selective.

The Co-Op schedule provides for interviews and selection by the companies in the spring semester of the sophomore year. Those students selected attend Lehigh for a challenging summer schedule of junior-level coursework, then begin their first work rotation with the sponsoring company in mid-August. This rotation will last until mid-January when the student returns to Lehigh for the second semester coursework of the junior year. The Co-Op experience is completed with a second work rotation the following summer (mid-May through August). Students earn three, free elective credits per successful work assignment for a total of six free elective credits. These six credits are in ENGR 200 (<http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/engineering>) and are taken as P/F (Pass/Fail).

Technical minors (Available to all students but most require prerequisites from engineering curricula)

Technical Minor	Department
aerospace engineering	Mechanical Engineering
biotechnology	Chemical Engineering
chemical engineering	Chemical Engineering

computer science	Computer Science and Engineering
electrical engineering	Electrical Engineering
engineering leadership	Industrial and Systems Engineering
energy engineering	Mechanical Engineering
environmental engineering	Civil & Environmental Engineering
manufacturing systems	Industrial & Systems Engineering
materials science	Materials Science & Engineering
nanotechnology	Materials Science & Engineering
polymer science	Center for Polymer Science Engineering

Center for Manufacturing Systems Engineering, Ben Franklin Technology Partners, Manufacturers Resource Center, Center for Advanced Materials and Nanotechnology, and Center for Optical Technologies.

Interdisciplinary Minors (For engineering students)

A minor in Engineering Leadership provides students with knowledge, experiences and interaction with successful business managers in order to become more effective leaders. For more information about this minor: <http://www.lehigh.edu/~inleader/curriculum.html>

The College of Business and Economics offers a minor in Business for students in the College of Arts and Sciences and P.C. Rossin College of Engineering and Applied Science to provide students with knowledge and skills to allow them to make informed business decisions. A sequential sequence of courses is designed to integrate such traditional topics as accounting, finance, marketing, and management. For more information about his minor: <http://cbe.lehigh.edu/academics/undergraduate/degree-programs/business-minor> . There is also a minor in Real Estate: <http://cbe.lehigh.edu/academics/undergraduate/degree-programs/real-estate-minor> and a minor in Entrepreneurship: <http://cbe.lehigh.edu/academics/undergraduate/degree-programs/entrepreneurship-minor> . The courses in the latter treat subjects such as intellectual property, creativity and innovation, venture capital, positioning of products and services, and understanding the entrepreneurial mindset.

Students in engineering can also earn a minor in various humanities or social sciences by using their humanities and social science electives coupled with their free electives.

Engineering Minor (for non-engineering students)

The College of Engineering enables undergraduate students enrolled in the Colleges of Arts and Sciences and in the College of Business and Economics to earn a minor in engineering. This unique program provides students with insight into the world of engineers: who they are, what they do, and how they think. Students pursuing the Engineering Minor develop an understanding of the tools and techniques engineering use on a day-to-day basis.

The mission of the minor is to educate non-engineering students about engineering methodology, specifically how engineers solve problems; how they design, manufacture, and analyze problems; and how other factors such as economics, safety, ethics, and environmental issues affect the engineering design process. Fifteen credit hours of required and elective coursework are required to fulfill the engineering minor. For more information about this minor: <http://www.lehigh.edu/~inengmnr/index.html>

Music Option

Music and Engineering is not a major in itself. However, Lehigh attracts many engineering and science students who wish to continue their active involvement in music and the music department. For those students who are interested in pursuing this option, music can be taken as a second degree, minor or through free electives.

Undergraduate research through Centers and Institutes

Faculty and students in the college also have research and scholarship activities in a number of centers and institutes, where graduate and undergraduate students work closely with faculty members. These include: Center for Advanced Technology for Large Structural Systems, Biopharmaceutical Technology Institute, Chemical Process Modeling and Control Center, Emulsion Polymers Institute, Energy Research Center, Enterprise Systems Center, Fritz Laboratory, Sherman Fairchild Center for Solid-State Studies, Polymer Science and Engineering Center, Structural Stability Research Council, Council on Tall Buildings and Urban Habitat,