Design Engineering

Design Engineering (https://engineering.brown.edu/undergraduate/concentrations/design-engineering/) (DE) teaches students to understand not just the how and what, but the why and why not behind the creation of technologically enabled products, services and systems. Methodologies, frameworks and analytical tools to evaluate strategic and systemic implications and consequences of these products, services and systems are considered. DE prepares students to (a) effectively apply engineering principles and quantitative analysis to make design decisions, (b) utilize complementary and conflicting principles from domains other than engineering in design decisions, (c) adeptly apply systemic principles to show interactions within and between systems, and (d) achieve fluency in human-centered and systems design processes and principles to analyze and synthesize responses to complex real-world problems.

Visit https://engineering.brown.edu/undergraduate/concentrations/design-engineering

The DE program has 19 required courses and a required narrative explaining why the student is choosing Design Engineering, their proposed pathway, and how their courses support that pathway. Course requirements include three courses in mathematics; one introductory engineering design course; one engineering gateway course; one natural science course; one computer science course; two engineering design courses (ENGN 0610 and ENGN 0620); three cognitive, psychological or social science courses (either from the list provided or with concentration advisor approval); and six upper-level courses curated by a student's chosen pathway focus, from which four must be engineering courses. The program culminates with a capstone, design or independent study experience. Brown's Design Engineering Bachelor of Science degree is non-ABET accredited.

Program Requirements

Introduction to Engineering		
ENGN 0032	Introduction to Engineering: Design	1
or ENGN 0030	Introduction to Engineering	
Engineering Gateway (courses selected should include those required for the student's proposed pathway)		
ENGN 0040	Engineering Statics and Dynamics	1
or ENGN 0410	Materials Science	
or ENGN 0490	Fundamentals of Environmental Engineering	
or ENGN 0500	Digital Computing Systems	
or ENGN 1490	Biomaterials	
Basic Physical/Life Science		**1**
BIOL 0200	The Foundation of Living Systems	
CHEM 0330	Equilibrium, Rate, and Structure	
NEUR 0010	The Brain: An Introduction to Neuroscience	
Computer Science		**1**
CSCI 0111	Computing Foundations: Data	
CSCI 0150	Introduction to Object-Oriented Programming and Computer Science	
CSCI 0170	Computer Science: An Integrated Introduction	
CSCI 0190	Accelerated Introduction to Computer Science	
APMA 0160	Introduction to Scientific Computing	
Mathematics: Calculus and Methods of Applied Mathematics and Statistics		
MATH 0200	Multivariable Calculus (Physics/ Engineering)	1
or MATH 0180	Multivariable Calculus	
APMA 0350	Applied Ordinary Differential Equations	1
A third mathematics course from the following list:		1
MATH 0100	Single Variable Calculus, Part II	
MATH 0190	Single Variable Calculus, Part II (Physics/ Engineering)	
APMA 0360	Applied Partial Differential Equations I	
APMA 1650	Introduction to Probability and Statistics with Calculus	
APMA 1655	Introduction to Probability and Statistics with Theory	
CSCI 1450	Advanced Introduction to Probability for Computing and Data Science	
MATH 0520	Linear Algebra	
MATH 0540	Linear Algebra With Theory	
Design Engineering Specific Requirements		
ENGN 0610	Systems Thinking	1
ENGN 0620	Design Brief	1
Social Science Research, Decision Making and Societal Context		
One course that covers Social Science Research Methods:		1
ANTH 1940	Ethnographic Research Methods	
SOC 1117	Focus Groups for Market and Social Research	
SOC 1118	Context Research for Innovation	
POLS 0500	Foundations of Political Analysis	
Or an equivalent course approved by the Concentration Advisor		
One course on Decision Making and Design:		1
CPSY 0220	Making Decisions	
CPSY 0010	Mind, Brain and Behavior: An Interdisciplinary Approach	
CPSY 0700	Social Psychology	
CPSY 1730	Psychology in Business and Economics	
EDUC 0800	Introduction to Human Development and Education	
PHIL 1610	Decision Theory: Foundations and Applications	
Or an equivalent course approved by the Concentration Advisor		
One course on Societal Context for Design:		1
AMST 1611S	US Popular Culture	
ANTH 0100	Introduction to Cultural Anthropology	
ANTH 1236	Urban Life: Anthropology in and of the City	
ARCH 0755	Engineering and Technology in the Ancient World	
ECON 0110	Principles of Economics	
ECON 1390	Inequality of Income, Wealth, and Health in the United States	
HIAA 0140	Structural and Architectural Analysis	
HIAA 1171	Cities, Landscapes, and Design in the Age of Pandemics	
PHIL 0401	Ethics of Digital Technology	
PHIL 0403	Ethics and Politics of Data	
PHIL 1430	Moral Theories	
TAPS 0220	Persuasive Communication	
URBN 1870D	Downtown Development	
Or an equivalent course approved by the Concentration Advisor		

Advanced Courses: Six engineering and/or engineering-related courses, at least four of which are ENGN courses, including two ENGN courses that are above the 1000-level (cannot be Entrepreneurship or Innovation Management and Entrepreneurship (PRIME) program courses). The fifth and the sixth courses can be non-introductory STEM courses. The pathway must be approved by the Concentration Advisor and constitute a coherent body of work. [1]		**6**
One Capstone, Design or Independent Study		**1**
ENGN 1000	Projects in Engineering Design I	
ENGN 1001	Projects in Engineering Design II	
ENGN 1140	Chemical Process Design	
ENGN 1150	Environmental Engineering Design	
ENGN 1230	Instrumentation Design	
ENGN 1620	Analysis and Design of Electronic Circuits	
ENGN 1640	Design of Computing Systems	
ENGN 1650	Embedded Microprocessor Design	
ENGN 1740	Computer Aided Visualization and Design	
ENGN 1760	Design of Space Systems	
ENGN 1930L	Biomedical Engineering Design and Innovation	
ENGN 1930M	Industrial Design	
ENGN 1931D	Design of Mechanical Assemblies	
ENGN 1931L	Biomedical Engineering Design and Innovation II	
ENGN 1972	Independent Study in Engineering Design	
ENGN 1973	Independent Study in Engineering Design	
Total Credits		**19**

[1] The following courses do not qualify for this purpose: ENGN 0020, ENGN 0090, ENGN 0130, ENGN 0350, ENGN 0900, ENGN 0930A, ENGN 1010, ENGN 1800, ENGN 1931H, ENGN 1931J, ENGN 1931Q, ENGN 1931W, ENGN 1932D, ENGN 2000, ENGN 2040, ENGN 2060, ENGN 2095, ENGN 2110, ENGN 2120, ENGN 2125, ENGN 2130, ENGN 2140, ENGN 2150, ENGN 2160, ENGN 2172, ENGN 2173, ENGN 2180