

INTEGRATED DESIGN, ENGINEERING & APPLIED SCIENCE MINOR

MINOR DESCRIPTION

The challenges of our society demand nimble students that utilize an integrated skill set. The Integrated Design, Engineering & Applied Science (IDEAS) program prepares students to succeed at the intersection of design, the arts, and engineering in a liberal arts context. Students develop foundational knowledge in these areas by working in collaborative groups and individually on project-based assignments which emphasize making and doing as critical forms of knowledge. Core courses within the minor provide a foundation in the technical, aesthetic, and human dimensions of design and engineering. These courses are followed by a focus in one of many modules that span design and engineering disciplines.

ADMISSION TO THE MINOR

Students should complete at least one course from the required project-based courses to be admitted to the IDEAS minor. The project-based courses are in two categories: Design & Engineering (IDEA170 or IDEA175), and Design & Arts (IDEA190, IDEA233, or IDEA285). Declare the IDEAS minor through your WesPortal.

MINOR REQUIREMENTS

A minor in IDEAS requires six credits for students in the class of 2022 or 2023. Students must complete two project-based design courses, one focusing on engineering, and one on the arts (options are listed below). Students are strongly encouraged to complete a third course that examines the social and cultural aspects of design and/or engineering (options are listed below); this course is a requirement for students in the class of 2024 and beyond, (and hence seven credits total for the minor are required for these students). The remaining four elective courses come from course "modules." Some courses offered on an irregular basis are not listed in modules, but may be used for electives, subject to approval from the minor advisor. In addition, students will assemble a digital or physical portfolio of their work from project-based courses to complete the minor.

Student Portfolio

All IDEAS minors will assemble a portfolio encompassing work developed within IDEAS courses. Students participating in the minor will begin the development of a digital and/or physical portfolio in the required project-based minor courses. In consultation with an advisor, projects will be added to this portfolio and reviewed before completion of the minor.

REQUIRED PROJECT-BASED DESIGN COURSES

Students must complete one course from each group below.

Code	Title	Hours
One Project-Based Design & Engineering Course		
IDEA170	Introduction to Mechanical Design and Engineering	1

IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
IDEA175	Introduction to Electrical Design & Engineering	
One Project-Based Design & Arts Courses		
IDEA190	Digital Foundations	1
IDEA233	Studies in Computer-based Modelling and Digital Fabrication	
IDEA285	Form And Code	

REQUIRED COURSE ON THE SOCIAL AND CULTURAL ASPECTS OF DESIGN & ENGINEERING

Students must complete one course from the list below. This requirement does not apply to the class of 2022.

Code	Title	Hours
One Course on Social and Cultural Aspects of Design & Engineering		
IDEA180	Design in Context: Case Studies in Design, Engineering, and Technology	1
AMST260	Bioethics and the Animal/Human Boundary	
ARHA338	Bauhaus: Art, Craft, Design	
ARHA352	Energy and Modern Architecture, 1850-2020	
CSPL115F	Diffusion of Innovation (FYS)	
CSPL235	Activism and Theories of Change	
CSPL239	Startup Incubator: The Art and Science of Launching Your Idea	
CSPL262	Patricelli Center for Social Entrepreneurship Fellowship	
CSPL316	Human Rights Advocacy: Critical Assessment and Practical Engagement in Global Social Justice	
ENVS210	Evolution in Human-Altered Environments	
ENVS214	Climate Change Economics and Policy	
ENVS282	Sustainable Agriculture and Food Systems	
ENVS308	Comparative Urban Policy	
EDST230	Schools in Society	
FGSS321	BioFeminisms: Science, Matter, and Agency	
HIST221	History of Ecology	
HIST261	Enlightenment and Science	
HIST267	Development in Question: Conservation in Africa	
HIST385	Science and the State	
PHIL287	Philosophy of Science	
PHIL288	Sciences as Social and Cultural Practices	
RELI317	Colonizing Space: Exploration, Extraction, and Inhabitation	
SISP240	Research Methods in Science Studies	
SOC212	Sociology and Social Theory	
SOC315	The Health of Communities	

ELECTIVE COURSES FROM MODULES:

The course modules provide topical focus in the wide array of areas in Design, Engineering, and Applied Sciences. The IDEAS modules consist of four courses above the two required courses, to make the total of six courses in the minor.

Some of the proposed modules include courses listed among those that will satisfy the two-course distribution requirement listed above. Students will most efficiently complete such a module by selecting a required course that also contributes to the module. Students will work with an advisor to help them achieve the appropriate depth of study in the module area. Related courses that are not offered on a regular basis may be approved for minor credit, subject to review by the minor advisor. Students may propose substitutions or alternate modules, which must have approval from the advisor of the minor. Typically, introductory (100-level) courses may not be counted toward the elective requirement.

3D DESIGN

The study of objects, their design, and technologies of production. This module consolidates project-based learning in architecture, product design and furniture design.

Code	Title	Hours
If not completed in the general requirements, two of the following design courses:		3
ARST233	Studies in Computer-based Modelling and Digital Fabrication	
ARST235	Architecture I	
ARST336	Architecture II	
IDEA210	How Things Fail: Mechanics and Materials	
THEA359	Space Design for Performance	
THEA185	Text & Visual Imagination: Introduction to Eco Design for Performance	
One course in the History of Architecture:		1
ARHA151	European Architecture to 1750	
ARHA210	Romanesque and Gothic Art and Architecture	
ARHA224	Italian Art and Architecture of the 16th Century	
ARHA244	European Architecture and Urbanism, 1750-1910	
ARHA246	American Architecture and Urbanism, 1770--1914	
ARHA254	Architecture of the 20th Century	
ARHA258	Contemporary World Architecture	
ARHA284	Buddhist Art and Architecture in East Asia	
ARHA352	Energy and Modern Architecture, 1850-2020	
One additional course from the following list, for a total of six courses:		2
ARST131	Drawing I	
ARST190	Digital Foundations	

APPLIED MATH

Mathematical methods applied in science, engineering, computer science, and social science.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170	Introduction to Mechanical Design and Engineering	
IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
IDEA175	Introduction to Electrical Design & Engineering	
One course in computing and programming foundations:		1
COMP112	Introduction to Programming	

COMP113	Bioinformatics Programming	
COMP114	How to Talk to Machines	
COMP115	How to Design Programs	
COMP211	Computer Science I	
PHYS340	Computational Physics	
Two additional courses from the following list, for a total of six courses:		2
MATH229	Differential Equations	
MATH231	An Introduction to Probability	
MATH232	Mathematical Statistics	
PHYS213	Waves and Oscillations	
PHYS217	Nonlinear Dynamics and Chaos	
PHYS565	Mathematical Physics	

BIOLOGICAL OR BIOCHEMICAL

Applications of biology and biochemistry to solve challenges in life and health sciences.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170	Introduction to Mechanical Design and Engineering	
IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
IDEA175	Introduction to Electrical Design & Engineering	
One course in computing and programming foundations:		1
COMP112	Introduction to Programming	
COMP113	Bioinformatics Programming	
COMP114	How to Talk to Machines	
COMP115	How to Design Programs	
COMP211	Computer Science I	
PHYS340	Computational Physics	
Two additional courses from the following list, for a total of six courses:		2
BIOL212	Principles and Mechanisms of Cell Biology	
BIOL265	Bioinformatics Programming	
BIOL310	Genomics Analysis	
CHEM396	Molecular Modeling and Design	
IDEA261	Science Materials For a Malagasy Classroom	
MB&B228	Introductory Medical Biochemistry	
MB&B325	Introduction to Biomolecular Structure	
MB&B377	Advanced Genetics	
MB&B381	Physical Chemistry for the Life Sciences	

CHEMICAL

Applications of chemistry to the design of new chemicals, materials, and energy production.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170	Introduction to Mechanical Design and Engineering	
IDEA173	Introduction to Sensors, Measurement, and Data Analysis	

IDEA175	Introduction to Electrical Design & Engineering	
One course in computing and programming foundations:		1
COMP112	Introduction to Programming	
COMP113	Bioinformatics Programming	
COMP114	How to Talk to Machines	
COMP115	How to Design Programs	
COMP211	Computer Science I	
PHYS340	Computational Physics	
Two additional courses from the following list, for a total of six courses:		2
CHEM251	Principles of Organic Chemistry I	
CHEM252	Principles of Organic Chemistry II	
CHEM337	Physical Chemistry I: Quantum Mechanics and Spectroscopy	
CHEM338	Physical Chemistry II: Thermodynamics, Statistical Mechanics, and Kinetics	
CHEM377	Chemistry of Materials and Nanomaterials	
CHEM381	Physical Chemistry for the Life Sciences	
CHEM396	Molecular Modeling and Design	

COMPUTER

Applications of computer science to the design of new computer hardware and software.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170	Introduction to Mechanical Design and Engineering	
IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
IDEA175	Introduction to Electrical Design & Engineering	
One course in computing and programming foundations:		1
COMP112	Introduction to Programming	
COMP113	Bioinformatics Programming	
COMP114	How to Talk to Machines	
COMP115	How to Design Programs	
COMP211	Computer Science I	
PHYS340	Computational Physics	
Two additional courses from the following list, for a total of six courses:		2
IDEA285	Form And Code	
COMP212	Computer Science II	
COMP301	Automata Theory and Formal Languages	
COMP312	Algorithms and Complexity	
COMP321	Design of Programming Languages	
COMP331	Computer Structure and Organization	
IDEA350	Computational Media: Videogame Development	

DIGITAL AND GRAPHIC DESIGN

Design in 2D and 3D, ranging from letterpress printing to the creation of virtual spaces, always referencing production and its technology.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA190	Digital Foundations	
ARST131	Drawing I	
ARST243	Graphic Design	
THEA185	Text & Visual Imagination: Introduction to Eco Design for Performance	
One course in Art History at the 200-level or higher:		1
ARHA203	Survey of Greek Archaeology and Art	
ARHA205	Visualizing the Classical	
ARHA207	Survey of Roman Archaeology and Art	
ARHA210	Romanesque and Gothic Art and Architecture	
ARHA213	Cross, Book, Bone: Early Medieval Art, c. 300-1100	
ARHA219	Pyramids and Funeral Pyres: Death and the Afterlife in Greece and Egypt	
ARHA220	Northern Renaissance Art	
ARHA221	Early Renaissance Art and Architecture in Italy	
ARHA224	Italian Art and Architecture of the 16th Century	
ARHA225	Art and Society in Ancient Pompeii	
ARHA233	Art and Culture of the Italian Baroque	
ARHA240	Revolutionary France and the Birth of Modern Art, 1789-1900	
ARHA244	European Architecture and Urbanism, 1750-1910	
ARHA246	American Architecture and Urbanism, 1770--1914	
ARHA252	Contemporary Art Since 1980	
ARHA253	Art After 1945	
ARHA254	Architecture of the 20th Century	
ARHA257	Just Cities: Architectures of Public Encounter	
ARHA258	Contemporary World Architecture	
ARHA2800	Islamic Art and Architecture	
ARHA284	Buddhist Art and Architecture in East Asia	
Two additional courses from the following list, for a total of six courses:		2
ARST233	Studies in Computer-based Modelling and Digital Fabrication	
IDEA285	Form And Code	
IDEA350	Computational Media: Videogame Development	

ELECTRICAL

Applications of electrical and magnetic systems to the design of new devices and communications.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170	Introduction to Mechanical Design and Engineering	
IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
IDEA175	Introduction to Electrical Design & Engineering	

One course in computing and programming foundations:	1
COMP112 Introduction to Programming	
COMP113 Bioinformatics Programming	
COMP114 How to Talk to Machines	
COMP115 How to Design Programs	
COMP211 Computer Science I	
PHYS340 Computational Physics	
Two additional courses from the following list, for a total of six courses:	2
ASTR240 Radio Astronomy	
PHYS213 Waves and Oscillations	
PHYS214 Quantum Mechanics I	
PHYS324 Electricity and Magnetism	
PHYS342 Experimental Optics	
PHYS345 Electronics Lab	

ENVIRONMENTAL

Application of environmental and ecological knowledge to the protection of ecosystems and human population.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
IDEA170 Introduction to Mechanical Design and Engineering		
IDEA175 Introduction to Electrical Design & Engineering		
IDEA210 How Things Fail: Mechanics and Materials		
IDEA215 Introduction to Sensors, Measurement, and Data Analysis		
One course in computing and programming foundations:		1
COMP112 Introduction to Programming		
COMP113 Bioinformatics Programming		
COMP114 How to Talk to Machines		
COMP115 How to Design Programs		
COMP211 Computer Science I		
PHYS340 Computational Physics		
Two additional courses from the following list, for a total of six courses:		2
BIOL216 Ecology		
E&ES244 Soils		
E&ES246 Hydrology		
E&ES250 Environmental Geochemistry		
E&ES253 Energy Sustainability: An examination of US, New England and Connecticut Energy		
E&ES280 Introduction to GIS		
E&ES361 Living in a Polluted World		
E&ES375 Modeling the Earth and Environment		

GEOMECHANICS/GEOSYSTEMS

Applications of geology and earth science to the development and preservation of subterranean resources.

Code	Title	Hours
If not completed in the general requirements, the following engineering design courses:		2

CIS170 Introduction to Mechanical Design and Engineering	
CIS175 Introduction to Electrical Design & Engineering	
One course in computing and programming foundations:	1
COMP112 Introduction to Programming	
COMP113 Bioinformatics Programming	
COMP114 How to Talk to Machines	
COMP115 How to Design Programs	
COMP211 Computer Science I	
PHYS340 Computational Physics	
Two additional courses from the following list, for a total of six courses:	2
E&ES213 Mineralogy	
E&ES215 Earth Materials	
E&ES223 Structural Geology	
E&ES280 Introduction to GIS	
E&ES375 Modeling the Earth and Environment	

MATERIALS SCIENCE

Discovery, design, and properties of new materials.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
CIS170 Introduction to Mechanical Design and Engineering		
CIS175 Introduction to Electrical Design & Engineering		
IDEA173 Introduction to Sensors, Measurement, and Data Analysis		
One course in computing and programming foundations:		1
COMP112 Introduction to Programming		
COMP113 Bioinformatics Programming		
COMP114 How to Talk to Machines		
COMP115 How to Design Programs		
COMP211 Computer Science I		
PHYS340 Computational Physics		
One course in statics and dynamics:		1
IDEA210 How Things Fail: Mechanics and Materials		
One additional course from the following list, for a total of six courses:		1
CHEM377 Chemistry of Materials and Nanomaterials		
CHEM379 Nanomaterials Lab		
PHYS316 Thermal and Statistical Physics		
PHYS358 Condensed Matter		

MECHANICAL

Application of mechanics, kinematics, and thermodynamics to design and develop new mechanical systems.

Code	Title	Hours
If not completed in the general requirements, two of the following engineering design courses:		2
CIS170 Introduction to Mechanical Design and Engineering		
CIS175 Introduction to Electrical Design & Engineering		

IDEA173	Introduction to Sensors, Measurement, and Data Analysis	
One course in computing and programming foundations:		1
COMP112	Introduction to Programming	
COMP113	Bioinformatics Programming	
COMP114	How to Talk to Machines	
COMP115	How to Design Programs	
COMP211	Computer Science I	
PHYS340	Computational Physics	
One course is statics and dynamics:		1
IDEA210	How Things Fail: Mechanics and Materials	
One additional course from the following list, for a total of six courses:		1
CHEM338	Physical Chemistry II: Thermodynamics, Statistical Mechanics, and Kinetics	
PHYS213	Waves and Oscillations	
PHYS217	Nonlinear Dynamics and Chaos	
PHYS313	Classical Dynamics	
PHYS316	Thermal and Statistical Physics	
PHYS358	Condensed Matter	

PERFORMANCE DESIGN

Stage design for theater or dance, sets, costumes, and lighting.

Code	Title	Hours
One course in the History of Design:		1
ARHA151	European Architecture to 1750	
ARHA244	European Architecture and Urbanism, 1750-1910	
ARHA246	American Architecture and Urbanism, 1770--1914	
ARHA254	Architecture of the 20th Century	
Two additional courses from the following list:		2
THEA185	Text & Visual Imagination: Introduction to Eco Design for Performance	
ARST233	Studies in Computer-based Modelling and Digital Fabrication	
THEA305	Lighting Design for the Theater	
THEA360/ DANC364	Media for Performance	
THEA359	Space Design for Performance	
THEA383	Introduction to Costume Design for Performance	
One additional credit from the following list, for a total of six credits:		1
THEA434	Applied Scenography: From Idea to the Stage	
and		
THEA435	Performance Practice in Design A	
or		
THEA437	Performance Practice in Design B	

ADDITIONAL MINOR INFORMATION

- There may be prerequisite courses required for some of the courses listed above. These prerequisites do not count towards the minor.

- Some of the courses may be cross-listed with other departments; students can enroll in any listing for the specified course.
- Students may propose an alternate course module or a different combination of elective courses, in consultation with the IDEAS advisor.
- Some courses may overlap with existing major requirements. A student may only count two course credits toward the IDEAS minor that are also counted towards a major, linked major, certificate, or other minor, unless receiving explicit approval from the IDEAS minor administrator to waive this requirement.