



## Goals, Pedagogy and Curriculum

### [Pedagogy](#) and [Curriculum](#)

#### **Pedagogy**

Olin College's educational perspective provides a distinctive student experience designed to foster student engagement and development. Some of the key features of the Olin College experience are described in the following paragraphs.

#### **Hands-On Learning**

Olin has a strong commitment to incorporating hands-on educational experiences through lab and project work in many courses. From the outset of the curriculum, students build technical knowledge and develop practical skills by analyzing, designing or fabricating engineering systems. First year mathematics, science and engineering classes provide hands-on projects involving the modeling, simulation and analysis of engineering systems. Science courses offer opportunities for experimental design and the use of modern instrumentation and testing techniques. The design stream offers opportunities for students to design, prototype and test solutions to authentic problems.

#### **Open-Ended Project-Based Learning**

Throughout the curriculum, Olin students gradually build competency in solving open-ended problems. Projects are found in all four years of the curriculum, and project experiences gradually increase in scale, complexity and realism as students develop their knowledge and skills. In open ended projects, student teams identify and define problems, assess opportunities, apply technical knowledge, demonstrate understanding of contextual factors, muster appropriate resources to solve problems, and apply skills such as teamwork, communication and idea generation. Olin's open-ended project emphasis culminates in an ambitious two-semester engineering capstone project that engages student teams in significant design problems with realistic constraints for an external partner.

#### **Multidisciplinary Learning**

Olin experiences are designed to build connections amongst fundamental science, mathematics and engineering; amongst different fields of engineering; amongst the arts, humanities and social sciences and technical disciplines; and amongst business, entrepreneurship and technology. As a result, the Olin curriculum is conceived and taught in a highly interdisciplinary way.

In the first year, each course in the Olin Introductory Experience (OIE) is designed to take advantage of the synergies that exist among mathematics, science and engineering topics, including coordinated opportunities for students to apply fundamental mathematics and science to real engineering problems that further elucidate important linkages among disciplinary topics.

In addition to the OIE, Olin builds multidisciplinary connections through tightly coupled, faculty team taught courses. Many other courses feature teaching or visits from faculty members who share different perspectives and thereby help students understand the broader context and implications of their work.

#### **Competency Assessment**

In addition to course-based graduation requirements, Olin develops and assesses student growth in a



number of overarching competency areas. Olin has established nine competencies in which students are expected to be proficient upon graduation. The competencies are:

**QUALITATIVE ANALYSIS.** Olin graduates will be able to analyze and to solve problems qualitatively in engineering and in other disciplines. In particular, students will be able to:

- Use appropriate tools of the profession to conduct qualitative analysis;
- Use science, math, and engineering concepts to conduct qualitative analysis; and
- Identify, formulate, and solve engineering problems in a qualitative manner.

**QUANTITATIVE ANALYSIS.** Olin graduates will be able to analyze and to solve problems quantitatively in engineering and in other disciplines. In particular, students will be able to:

- Use appropriate tools of the profession to conduct quantitative analysis;
- Use science, math, and engineering concepts to conduct quantitative analysis; and
- Identify, formulate, and solve engineering problems in a quantitative manner.

**TEAMWORK.** Olin graduates will be able to contribute effectively in a variety of roles on teams, including multi-disciplinary teams.

**COMMUNICATION.** Olin graduates will be able to convey information and ideas effectively, to a variety of audiences, using written, oral, and visual and graphical communication.

**LIFE-LONG LEARNING.** Olin graduates will be able to identify and to address their own educational needs in a changing world.

**CONTEXTUAL AWARENESS.** Olin graduates will demonstrate knowledge of the ethical, professional, business, social, and cultural contexts of engineering. In particular, students will be able to:

- Demonstrate the benefits of a broad education, an appreciation for contemporary issues, and an ability to connect these topics to their work as engineers;
- and Articulate their professional and ethical responsibilities.

**DESIGN.** Olin graduates will be able to develop creative, effective designs that solve real problems. In particular, they will be able to:

- Develop designs of products, systems, or processes that respond to authentic needs;
- Take into account the social, economic, or environmental constraints on the design; and
- Consider the potential social, economic, or environmental impact of the design.

**DIAGNOSIS.** Olin graduates will be able to identify and resolve problems within complex systems. In particular, students will be able to:

- Develop hypotheses;
- Develop and conduct experiments to test hypotheses; and
- Analyze and interpret the results of these experiments.

**OPPORTUNITY ASSESSMENT AND DEVELOPMENT.** Olin graduates will be able to identify opportunities, to predict challenges and costs associated with the pursuit of opportunities, and to muster resources in response to opportunities.



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### **Feedback**

Olin College fosters a culture of continual feedback and improvement. Olin's curriculum, courses and extra-curricular activities are shaped by student input and feedback. Faculty solicit student feedback and routinely adjust course direction and areas of emphasis to better address student educational needs. Students are expected to be active learners and participants in the process of continual improvement.

### **Individualized and Student-Designed Options**

Olin students may design or customize many aspects of their educational experience. Many Olin courses include student-designed components such as projects, self-study modules, and selection of emphasis areas. More substantial student-designed and student-driven learning may be found in the following activities:

#### Self-Study

All students are required to complete four credits of approved coursework in which each student works independently to select and study an area of interest. It is an opportunity to develop the skills and attitudes of life-long learning, a competency Olin considers vital for engineers working in an environment of rapidly changing technology.

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### **Concentrations and Capstones**

All students design a concentration in an area of interest within the Arts, Humanities, Social Sciences or Entrepreneurship with an opportunity to develop more depth through additional coursework or a capstone.

### **Cross-Registration**

Most students choose to complete some degree requirements at Olin's neighboring institutions. Cross-registration agreements are in place at Babson, Brandeis and Wellesley enabling Olin students to benefit from other institutions' expertise in the arts, humanities, social sciences, natural sciences and business topics.

### **Self-Designed Engineering (E) Degree Concentrations**

Besides designated concentrations, the Engineering (E) degree offers students the opportunity to design their own concentrations, subject to review and approval by the Engineering Program Group.

### **Away Experience**

The Olin curriculum is designed so that students who wish to spend a semester away from the college can do so. The away experience may take several forms including experience abroad or at another U.S. institution in a new cultural setting. The away experience can occur during a semester or a combination of a semester and summer.

### [Research \[1\]](#)



Some students choose to enhance their educational experience through participation in research activities. Olin offers many opportunities for faculty-directed undergraduate research, both during the academic year and during the summer. Students may receive either academic credit or pay for a research activity. Students are encouraged to become involved in research early in their undergraduate career, and may participate in research as early as their first year.

### [Independent Study](#) [1]

In independent study activities, students work with faculty members to design and implement a learning and assessment plan for the study of topics not covered by listed Olin courses.

### [Passionate Pursuits](#) [1]

Students are encouraged to undertake non-degree credit activities in the form of Passionate Pursuits. These programs seek to recognize the diversity of technical, artistic, entrepreneurial, humanist and philanthropic interests that students bring to the college. The college encourages the pursuit of such activities for both personal and professional development. Olin supports these endeavors by providing resources as well as recognition on the transcript.

## Curriculum

The Olin College curriculum provides a strong foundation in engineering, mathematics and applied science subjects and promotes development of engineering analysis, diagnosis, modeling and problem-solving skills. A full list of courses is available [here](#).

### Engineering

Engineering is using technical knowledge to solve society's problems. Every Olin graduate takes a program of studies designed to provide a superb grounding in the technical material of engineering while simultaneously connecting that material to its applications and contexts of use. From the earliest modeling and simulation activities in the courses Modeling and Simulation of the Physical World and Modeling and Control and the hands-on projects of Design Nature through the project-intensive Principles of Engineering and User-Oriented Collaborative Design courses, Olin students are continually putting engineering knowledge to work.

Each Olin student also pursues a major program or concentration that is broad, deep, coherent and rigorous, in the field of Electrical and Computer Engineering, Mechanical Engineering, or another area of Engineering of the student's choice. Olin's Engineering curriculum culminates in an engineering capstone project.

### Math and Science

Olin's mathematics and science curriculum serves two purposes. First, it provides students with an understanding of the deep and precise ideas that characterize science and mathematics. Second, it teaches fundamental ideas and techniques in science and mathematics whose application makes engineering possible.

A student's mathematics and science education begins at Olin with Modeling and Simulation of the Physical World. Their mathematics experience then continues with integrated mathematics courses covering vector calculus, linear algebra, differential equations and probability and statistics. Science at Olin consists of a breadth of classes in each of three disciplines: physics, chemistry and biology. Additional mathematics or science classes may be required by a particular program. Students may then focus their remaining science and mathematics distribution units in an area of their choice.



## Design

Over the course of four years, students complete design projects that enable them to apply technical and non-technical knowledge and skills, develop understanding of design processes, identify and define problems, explore contextual factors that contribute to design decisions, and muster the resources necessary to realize solutions. Students undertake open-ended design problems in many courses, but design learning is emphasized and explicitly developed through a sequence of required design courses. All students complete Design Nature, User-Oriented Collaborative Design, and a further design depth course in an area of interest.

## Arts, Humanities, and Social Sciences (AHS)

Olin students study the Arts, Humanities and Social Sciences in order to complete their liberal arts education, develop broad knowledge of social, cultural, and humanistic contexts, and foster their ability to apply contextual thinking in the study of engineering and other disciplines. A firm foundation in AHS content, skills and attitudes is an essential aspect of an engineering education. Students select AHS courses from offerings at Olin and neighboring institutions (Babson, Brandeis and Wellesley) in order to satisfy their individual needs and interests. All students complete a “foundation” AHS course that offers an overview of an AHS discipline, writing instruction and practice, an introduction to contextual and critical thinking, and integration of the content and perspectives of different disciplines. In addition, students complete additional AHS coursework in areas of interest.

Each Olin student also designs a sequence of AHS or Entrepreneurship courses to provide greater depth in a single field. In the AHS area, this sequence may culminate in a student-conceived AHS Capstone, providing students with an opportunity to integrate acquired skills and knowledge. AHS Capstone experiences include research or artistic works, service projects or advanced study.

## Entrepreneurship

Entrepreneurship (abbreviated at Olin as E!) is the process of identifying opportunities, fulfilling human needs, and creating value. An understanding of the knowledge, skills and behaviors required for success in entrepreneurship will position students to become better engineers and to make a positive difference in the world. To this end, Olin’s curriculum supports the learning of entrepreneurship, broadly defined. Olin graduates will demonstrate a capacity to identify social, technical and economic opportunities, to predict challenges and costs associated with the pursuit of opportunities, and to make decisions about which opportunities are most worthy of pursuit.

Olin students are required to complete a course in business and entrepreneurship. In addition, they have the opportunity to enroll in courses relating to business at Babson College, and interested students may design a sequence of courses to explore an entrepreneurship discipline in depth. Many Olin students pursue their entrepreneurial opportunities through the Olin business incubator, The Foundry, which provides support and space to student businesses.

Many students will also explore entrepreneurship and develop opportunity assessment abilities through their Engineering Capstone experience and out-of-class activities such as student clubs, community service and Passionate Pursuits. The Entrepreneurship experience can culminate in an Entrepreneurship Capstone, requiring students to integrate acquired skills and knowledge.

## Communication

Throughout the curriculum, Olin College integrates the instruction and practice of written, spoken, visual and graphical communication. Thus, it is not only within the Arts, Humanities and Social Sciences that an Olin student can expect communication-intensive course work. The Olin curriculum reflects the



college's commitment to the engineer as a highly skilled communicator.

### **Engineering Capstone**

A student's final year at Olin centers on an ambitious year-long culminating capstone in engineering, through either the Senior Capstone Program in Engineering (SCOPE) project or the Affordable Design and Entrepreneurship (ADE) project. The engineering capstone project engages interdisciplinary student teams in significant design problems with realistic constraints for an external partner and prepares students for work in their chosen careers. The student's decision to enroll in SCOPE or ADE is required a month following the Spring semester SCOPE Summit. This deadline is strictly enforced in an effort to ensure appropriateness of projects based on the composition of student teams.

**Source URL:** <http://www.olin.edu/course-catalog/goals-pedagogy-and-curriculum/>

**Links:**

[1] <http://www.olin.edu/course-catalog/other-academic-programs-and-opportunities/>