



# Course Catalog

2025-26



# Table of Contents

Information about Olin .....	4
Programs of Study and Degree Requirements .....	18
Courses, Credits, Hours .....	42
Academic Policies and Procedures .....	84



# Catalog 2025-26

# Information about Olin

---

## Olin College statement of identity

Olin College of Engineering is a private, non-profit, undergraduate institution offering Bachelor of Science in Electrical and Computer Engineering, Bachelor of Science in Engineering and Bachelor of Science in Mechanical Engineering degrees. Olin College is located in Needham, Massachusetts and was founded in 1997. The legal name of the college is Franklin W. Olin College of Engineering.

## History

Olin College is named for Franklin W. Olin (1860–1951), an engineer, entrepreneur, and professional baseball player. He founded the company known today as the Olin Corporation, a Fortune 1000 company.

In 1938, Mr. Olin transferred a large part of his personal wealth to a private philanthropic foundation. In 1997, the Foundation announced its intention to create Olin College, a total commitment of \$460 million, one of the largest grants in the history of American higher education. The Foundation's generosity enabled Olin to start from a "clean slate" in designing its academic program. The faculty worked with 30 student "partners" in the year prior to the formal opening of the college to design the curriculum.

The college welcomed its first freshman class in August 2002 and graduated its first class in May 2006. Members of that class and subsequent classes have gone on to graduate study and employment at many of the nation's top graduate schools and corporations. A significant proportion of the graduates have started entrepreneurial ventures, while others have sought alternative post-graduate occupations.

In creating the college, the Foundation was responding to calls for fundamental reform of engineering education from the National Science Foundation, the National Academy of Engineering, the accrediting organizations and the corporate community. To better prepare graduates for the challenges of the twenty-first century, these groups recommended that engineering education include more project-based learning, interdisciplinary teaching, and a greater emphasis on entrepreneurship, teamwork and communication. Olin College incorporated these suggestions, along with creative ideas of its own, into an innovative, hands-on curriculum that is attracting worldwide attention as a new model for engineering education.

Engineering education at Olin is in the liberal arts tradition, with a strong emphasis on the arts, humanities, social sciences, entrepreneurship, and design. Olin is committed to producing graduates who recognize the complexity of the world, who appreciate the relationship of their work to society and who are dedicated to creative enterprises for the good of humankind.

In 1999, Richard K. Miller was appointed Olin's first president and first employee. Over the next 21 years, he guided the college to being ranked among the top two undergraduate engineering schools in the country by US News & World Report. Miller stepped down from his role leading the unique engineering college on June 30, 2020, and became President Emeritus and Professor Emeritus of Mechanical Engineering.

On July 1, 2020, Gilda A. Barabino became Olin's second president and Professor of Biomedical and Chemical Engineering. The arrival of Olin's next president offered an opportunity for the community to reflect on the accomplishments of the college's first decade, to recommit to the founding values of innovation and collaboration, and to set an ambitious agenda for Olin's future. Under Barabino's leadership, Olin increased its representation of women and people of color among faculty and students under the strategic vision of "Engineering for Everyone," where engineering is open to all, and engineering is done in service of everyone. Barabino's tenure concluded on June 30, 2025.

R. May Lee was announced as Olin's third president beginning August 18, 2025. Lee is a visionary leader whose career spans global higher education, corporate leadership and entrepreneurship. With experience ranging from Wall Street to the nonprofit sector, and deep expertise in strategy, innovation and education, Lee brings a unique breadth of experience and insight to Olin.

## Olin College Mission Statement

Olin College prepares students to become exemplary engineering innovators who recognize needs, design solutions, and engage in creative enterprises for the good of the world. Olin is dedicated to continual discovery and development of effective learning approaches and environments, and to co-developing educational transformation with collaborators around the globe.

## Olin College Core Personal Values

*Integrity:* Complete honesty is expected from everyone in every situation. Even the appearance of a conflict of interest will be avoided. Successful long-term relationships depend on trust and open communication.

*Respect for Others:* Each person is treated with respect and dignity in all situations. Criticize only ideas — not people, and share responsibility. There is no room for abusive language or arrogance in relationships with others.

*Passion for the Welfare of the College:* As exemplified by the Trustees, each person will passionately pursue the overall interests of the college, while maintaining fairness to all individuals in all transactions. Personal advancement at the expense of others is discouraged and cooperation is expected.

*Patience and Understanding:* Each person will listen constructively, keep an open mind, and take the time to understand with empathy before reaching a conclusion. Effective teamwork depends on the confidence that others care and are willing to take the time to listen.

*Openness to Change:* Continuous improvement requires openness to change, even though this usually causes inconvenience, inefficiency, and risk of failure. Olin College will constantly strive to innovate and improve in every area.

## Olin College Core Institutional Values

*Quality and Continuous Improvement:* Olin College will strive for quality in all that it does. It will also strive for continuous improvement in all areas, and will measure its progress with appropriate national standards.

*Student Learning and Development:* Olin College is a student-centered institution. It will strive to provide educational experiences of exceptional quality and a student life environment that provides for healthy personal development.

*Institutional Integrity and Community:* Olin College will strive to develop long-term relationships based on honesty, fairness and respect. It will further strive to provide a safe environment that supports freedom of inquiry, acceptance of diversity and a sense of well-being.

*Institutional Agility and Entrepreneurism:* Olin College will strive to minimize bureaucracy, cost, and institutional inertia in all forms. It will further strive to accept appropriate risks in pursuit of opportunity.

*Stewardship and Service:* Olin College will strive to provide responsible stewardship of its resources while encouraging a spirit of service to society.

## Intellectual Property

### Intellectual Property, New Ventures and Copyright Policy

The College maintains a Board of Trustees approved policy on Intellectual Property, New Ventures and Copyright Policy for faculty, staff and students. The policy is based on the following ten principles. A copy of the current policy may be located on the Corporate, Foundation, and Sponsored Programs page in the policies and procedures section.

1. The policy should encourage creative and entrepreneurial activity, and catalyze the teaching of creative thinking and entrepreneurship.
2. The policy should help attract and retain the types of students, staff, and faculty we wish to have at Olin.
3. The policy should foster good will towards the college and encourage philanthropy.
4. The policy should be fair.
5. The policy should distinguish as little as possible between faculty, staff, and students since faculty, staff and students will work closely in teams.

6. The policy should safeguard an open and non-secretive atmosphere on campus.
7. The policy should safeguard the non-profit status of the college and minimize legal risks.
8. The policy should contribute to the college's financial health, e.g. by operating efficiently and by providing opportunities for growth of the endowment.
9. The policy should promote the dissemination of ideas and promote the public good.
10. The policy should be as simple as possible.

## Accreditation

### ABET accreditation

The Bachelor of Science in Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org), under the commission's General Criteria and Program Criteria for Engineering, General Engineering, Engineering Physics, Engineering Science, and Similarly Named Engineering Programs.

The Bachelor of Science in Electrical and Computer Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org), under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.

The Bachelor of Science in Mechanical Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org), under the commission's General Criteria and Program Criteria for Mechanical, and Similarly Named Engineering Programs.

### NECHE accreditation

Franklin W. Olin College of Engineering is accredited by the New England Commission of Higher Education.

Accreditation of an institution of higher education by the Commission indicates that it meets or exceeds criteria for the assessment of institutional quality periodically applied through a peer review process. An accredited college or university is one which has available the necessary resources to achieve its stated purposes through appropriate educational programs, is substantially doing so, and gives reasonable evidence that it will continue to do so in the foreseeable future. Institutional integrity is also addressed through accreditation.

Accreditation by the Commission is not partial but applies to the institution as a whole. As such, it is not a guarantee of every course or program offered, or the competence of individual graduates. Rather, it provides reasonable assurance about the quality of opportunities available to students who attend the institution.

Inquiries regarding the accreditation status by the Commission should be directed to the administrative staff of the institution. Individuals may also contact:

New England Commission of Higher Education  
3 Burlington Woods Drive, Suite 100  
Burlington, MA 01803-4514  
Phone: (781) 425-7785  
Email: [info@neche.org](mailto:info@neche.org)

## Catalog as a contract and right to modify

The Olin College Catalog is published online annually and is primarily intended for use by currently enrolled students, faculty, and staff. The catalogs provide an overview of the College's curriculum, academic programs, admission and financial aid programs, and educational resources. They also include academic policies, rules, regulations, and procedures; information about degree and certificate programs, including degree requirements; a listing and description of courses; and Board of Trustees, administration, and faculty information. Links to other related information are also included.

Information concerning academic requirements, courses, and programs of study contained in the catalog does not establish a binding contract between the student and the College. The College can change, discontinue, or add academic requirements, courses, and programs of study at any time, without notice. In the event that a change is made, students who enrolled under previous rules have the option of graduating under either catalog.

## Time limit on degree requirements

Students are encouraged to complete the bachelor's degree within 4 academic years (8 semesters).

Students have a maximum of ten years to complete their Bachelor of Science program under degree requirements in effect at the initial term of matriculation. Students experiencing a break in enrollment during these ten years will follow their curricular requirements at the point of matriculation provided that the break in enrollment does not exceed two calendar years, subject to course availability and available substitutions. Students readmitted after two years are held to the curricular requirements in place at the term of readmission. Students maintaining continuous enrollment without completing their degree requirements within ten years may petition the College to complete their degree requirements under the curricular requirements in effect during the term of admission.

## Board of Trustees

### Board of Trustees

Jeannie H. Diefenderfer, Chair  
 Al Bunshaft  
 Chee Chew, P'26  
 Lee Edwards, '07  
 Scott Harris, Clerk  
 Bruce Herring, Vice Chair  
 R. May Lee  
 Luke Morris, '17  
 William B. Norden  
 Gill Pratt  
 Nate Smith '07  
 Michael Sutton  
 Chris Wallace, '17

### Founding Members

Lawrence W. Milas  
 William B. Norden

### Trustees Emeriti

George R. Berbeco  
Tamara P. Davis  
C. Scott Gibson  
Sherwin Greenblatt  
Carla L. Gude  
Paul C. Jennings  
R. Douglas Kahn  
Robert N. McBurney  
George M. Milne, Jr.  
Venkatesh Narayanamurti  
James D. Plummer  
John W. Prados  
Doug Rauch  
Richard T. Roca  
Nina Saberi  
Howard H. Stevenson  
Kenneth R. Stokes, P'12  
Beverly Wyse, P'15

**Corporation name**

Legal Title: Franklin W. Olin College of Engineering Inc.

## Administration

### Administration 2025-26 Academic Year

**R. May Lee**

President

**Prescille Cernosia**

Director of Major Giving

**Donna Golemme**

Vice President for Finance and Administration

**Alyson Goodrow**

Chief Marketing and Communications Officer

**Stacey Harris**

Dean of Students

**Christopher Lee**

Co-Chair of Faculty Affairs & Professor of Mechanical Engineering

**Salvadore Liberto**

Dean of Admission and Financial Aid

**Nicholas Macke**

Chief Human Resources Officer

**Robert Martello**

Co-Chair of Faculty Affairs & Professor of the History of Science and Technology

**Samantha Michalka**

Associate Dean & Associate Professor of Computational Neuroscience and Engineering

**Richard Osterberg**

Chief Information Officer

## Faculty

## **Faculty 2025-26 Academic Year**

### **Sarah Spence Adams**

Professor of Mathematics and Electrical and Computer Engineering  
Ph.D. Cornell University

### **Jonathan Adler**

Professor of Psychology  
Ph.D. Northwestern University

### **Jesse Austin-Breneman**

Associate Professor of Mechanical Engineering  
Ph.D. Massachusetts Institute of Technology

### **Gilda A. Barabino**

Professor of Biomedical and Chemical Engineering and Former President  
Ph.D. Rice University

### **Debbie Chachra** *on leave Fall '25 and Spring '26*

Professor of Engineering  
Ph.D. University of Toronto

### **Andrea Cuadra '13**

Assistant Professor of Computer Science  
Ph.D. Cornell University

### **Diana Dabby**

Professor of Electrical Engineering and Music  
Music Program Director  
Ph.D. Massachusetts Institute of Technology

### **Zachary del Rosario '14**

Assistant Professor of Engineering  
Ph.D. Stanford University

### **Annick Dewald**

Visiting Assistant Professor of Engineering  
Ph.D. Massachusetts Institute of Technology

### **Helen Donis-Keller**

Professor of Biology and Art and Michael E. Moody Professor  
Ph.D. Harvard University

### **Gillian Epstein**

Associate Professor of English  
Ph.D. University of California, Berkeley

### **Daniela Faas**

Associate Professor of the Practice  
Director of Fabrication and Laboratory Operations  
Ph.D. Iowa State University

### **Alessandra Ferzoco**

Assistant Professor of Measurement Science  
Ph.D. The University of North Carolina at Chapel Hill

**Chhavi Goenka**

Assistant Professor of Engineering  
Ph.D. Boston University

**Erhardt Graeff**

Associate Professor of Social and Computer Science  
Ph.D. Massachusetts Institute of Technology

**Scott Hersey**

Associate Professor of Chemical and Environmental Engineering  
Ph.D. California Institute of Technology

**Jean Huang**

Associate Professor of Biology  
Ph.D. California Institute of Technology

**Christopher Lee**

Co-Chair of Faculty Affairs  
Professor of Mechanical Engineering  
Ph.D. University of Michigan

**Benjamin Linder**

Professor of Design and Mechanical Engineering  
Design Justice Studio (DJS) Program Director  
Ph.D. Massachusetts Institute of Technology

**Caitrin Lynch**

Professor of Anthropology  
Ph.D. University of Chicago

**Robert Martello**

Co-Chair of Faculty Affairs  
Professor of the History of Science and Technology  
Ph.D. Massachusetts Institute of Technology

**Steve Matsumoto** *on leave Spring '26 and Fall '26*

Associate Professor of Computer Science and Engineering  
Ph.D. Carnegie Mellon University

**Kenechukwu Mbanisi**

Assistant Professor of Robotics Engineering  
Ph.D. Worcester Polytechnic Institute

**Samantha Michalka**

Associate Dean  
Associate Professor of Computational Neuroscience and Engineering  
Ph.D. Boston University

**Amon Millner**

Professor of Computing and Innovation

Ph.D. Massachusetts Institute of Technology

**Bradley Minch**

Professor of Electrical and Computer Engineering  
Ph.D. California Institute of Technology

**Lawrence Neeley** *on leave Fall '25 and Spring '26*

Associate Professor of Design and Entrepreneurship  
Ph.D. Stanford University

**Carolyn Nugent**

Associate Professor of Computational Physics and Planetary Science  
Ph.D. University of California, Los Angeles

**Joanne Pratt**

Professor of Biological Sciences  
Ph.D. University of Pennsylvania

**Victoria Preston '16**

Assistant Professor of Engineering  
Ph.D. Massachusetts Institute of Technology

**Paul Ruvolo**

Professor of Computer Science  
Ph.D. University of California San Diego, La Jolla

**Daniel Sambor**

Assistant Professor of Engineering  
Ph.D. Stanford University

**Tim Ferguson Sauder**

Professor of the Practice in Design  
B.A. Wheaton College

**David Shuman**

Professor of Data Science and Applied Mathematics  
Ph.D. University of Michigan

**Lynn Andrea Stein**

Professor of Computer and Cognitive Science  
Ph.D. Brown University

**Jonathan Stolk**

Professor of Materials Science and Engineering Education  
Ph.D. University of Texas, Austin

**Elisabeth Sylvan**

Visiting Associate Professor of Sociotechnical Systems  
Ph.D. Massachusetts Institute of Technology

**Orion Taylor**

Visiting Assistant Professor of Mechanical Engineering  
Ph.D. Massachusetts Institute of Technology

**Emily Tow** *on leave Fall '25 and Spring '26*  
Associate Professor of Mechanical Engineering  
Ph.D. Massachusetts Institute of Technology

**Jessica Townsend**  
Professor of Engineering  
Ph.D. Massachusetts Institute of Technology

**Georgia Van de Zande**  
Assistant Professor of Mechanical Engineering  
Ph.D. Massachusetts Institute of Technology

**Rachel Yang**  
Assistant Professor of Electrical Engineering  
Ph.D. Massachusetts Institute of Technology

**Yevgeniya Zastavker**  
Professor of Physics and Education  
Ph.D. Massachusetts Institute of Technology

## Federal Compliance Statements

Intended for the use of prospective and current Olin College of Engineering students and interested others, Olin College's webpage contains information, links and references to helpful information on a variety of subjects, including Olin's academic programs, cost of attendance, financial aid, and post-graduate activities of alumni. Click on each title to view or hide the information in that section.

The page includes disclosures required by the Higher Education Act, as amended, and its implementing regulations, along with other information that may be of interest.

Please Visit our Olin College Consumer Information Site.

## Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) ensures confidentiality of educational records for eligible students (including, but not limited to, academic and enrollment data, and financial data related to scholarships, educational loans, need-based aid, and Olin Dollars) and restricts disclosure to or access by third parties, except as authorized by law. Educational records do NOT include the following:

1. Records that are in the sole possession of the person who created them and are not accessible to others with the exception of a substitute;
2. Records created and maintained solely by and for the college law enforcement unit;
3. Records maintained and used solely in relationship to the college and employment;
4. Records of Health Services or psychological counseling; and
5. Records pertaining to individual information after the person is no longer a student at the college.

FERPA affords students certain rights with respect to their education records. You have the right to:

1. inspect your educational records, with certain exceptions. If you wish to inspect your records, you need to submit a formal request to the Registrar. An appointment will be made within 45 days of the date of the request.

2. request an amendment if you believe your educational records are inaccurate or misleading. If you wish to request an amendment, you must do so in writing directed to the Registrar's Office. If it is determined that the record will not be amended, you will be notified of your right to, and procedures for requesting, a hearing.
3. provide written consent before Olin College discloses personally identifiable information from the student's education records, except to the extent that FERPA authorizes disclosure without consent.
4. file a complaint if you believe that the college has failed to comply with the requirements of FERPA. Complaints can be addressed to:

Family Policy Compliance Office  
 U.S. Department of Education  
 400 Maryland Avenue, SW  
 Washington, DC 20202-5901  
 Phone: 1.800.USA.LEARN

The college has designated certain types of personally identifiable information as "Directory Information." This includes your name, local address and telephone number, email address, photograph, degree program and major and concentration, dates of attendance, full and part time status and degrees, honors, and awards received. Your local address and telephone number are also contained in an annual directory published by the college and are accessible on an electronic directory. Both the printed and electronic directory are intended for the use of the college community. You may request, in writing, to restrict the disclosure of your directory information. Your request will remain in effect unless you revoke it. Additionally, if you do not want public directory information released, you must indicate that preference at the time the information is collected. You may request nondisclosure at any time during your enrollment by completing the "FERPA Request to Prevent Disclosure" form found in the Registrar's office.

The college, in compliance with the law, may disclose other (non-Directory) personally identifiable information without your prior consent under certain circumstances, including, but not limited to, the following:

1. To college officials, staff and others engaged in activities on behalf of the college with a legitimate educational interest (may include contracted individuals, person(s) serving on the Board of Trustees, student(s) serving on an official committee or assisting another school official in performing his/her tasks); a legitimate educational interest is defined at Olin as necessary to perform their work on behalf of the college;
2. In compliance with a lawful subpoena;
3. To officials of another institution where you are enrolled or seek to enroll, or where you received services in connection with placement or participation in internships, practica, affiliations, and other programs related to your courses or program at the college;
4. To authorized representatives of institutions from which you have received financial aid or applied for financial aid;
5. To organizations conducting studies "for, or on behalf of" Olin College;
6. Under the provisions of the USA Patriot Act;
7. Under the provisions of the Campus Sex Crimes Prevention Act;
8. To appropriate parties in the event of an emergency when the information is necessary to protect the health, safety, and/or welfare of the student or others.

## Equal Employment Opportunity Policy and Non-discrimination Policy

Franklin W. Olin College of Engineering rejects and condemns all forms of harassment, discrimination, retaliation, and disrespect, and is committed to sustaining a welcoming environment for every individual. It is the policy of Olin to adhere to all applicable state and federal laws prohibiting discrimination. Olin does not discriminate in admission to, access to, treatment in or employment in its programs and activities on the basis of a person's race, religion, color, national origin, age, marital or parental status, veteran status, sex, disability, genetic information, sexual orientation, gender identity or any other legally protected status.

Olin's commitment to non-discrimination includes an assertion that the College will not tolerate discrimination or harassment on the basis of sex, gender identity, and/or sexual orientation including, but not limited to sexual violence, dating and domestic violence, stalking, or retaliation in its community. The College follows through on that commitment, in part, through the implementation of a Title IX Policy that defines prohibited conduct and the process by which the College will address such conduct in different circumstances. Title IX of the Education Amendments of 1972 states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance." Sexual harassment is also prohibited under Title VII of the Civil Rights Act, Massachusetts General Laws Chapter 151B, Massachusetts Fair Education Practices Act, Massachusetts General Laws 151 C, Section 2(g), and other applicable state and federal statutes.

If any member of the Olin community feels that they have been discriminated against on the basis of race, religion, color, national origin, age, marital or parental status, veteran status, sex, disability, genetic information, sexual orientation, gender identity, marital or parental status, or any other legally protected status they should contact Olin's Title IX Coordinator and Director of Nondiscrimination Initiatives Erin Clark, JD at 781.292.2408. If any member of the Olin community feels that they have been discriminated against by a student on any other basis, they should contact Dean of Students Stacey Harris at 781.292.2321 to discuss possible referral of the matter under the Community Expectations Policy. Similarly, if any member of the Olin community feels that they have been discriminated against by an employee on any other basis, they should contact the Chief Human Resources Officer Nicholas Macke at 781.292.2407 to discuss investigation of the matter.

## Admission to Olin

Olin College is a supportive learning community of 375 undergraduate students who are bound by a vibrant culture of innovation and define engineering as a creative enterprise that begins and ends with people. Olin is on a mission to change undergraduate engineering education to make it fun, engaging, meaningful, and powerful through multidisciplinary experiences, a team approach, and project-based learning.

There are two parts to the unique admission process at Olin College of Engineering: the Application and Candidates' Weekends.

Students applying to Olin will submit the Common Application, including Olin-specific member questions and application fee, online through the Common Application website. Our application deadline is December 15, 2025. The application must be submitted by 11:59 PM in the applicant's local time zone on that date.

All applications are reviewed in December and January. We have a holistic review process through which we carefully evaluate each applicant's academic and personal qualities. At the end of January, applicants will be notified as to whether or not they will be advancing to the second phase of the admission process, Candidates' Weekends.

After the three Candidates' Weekends, Candidates are notified of their final admission decisions by late March. For additional details about the admission process, as well as information about visiting the campus, please refer to the website: <http://www.olin.edu/admission/>.

## Costs and Financial Aid

### **Committed to Affordability**

Olin remains dedicated to making education financially accessible. Our combination of rigorous academics, strong career outcomes, and generous financial aid is why The Princeton Review named Olin a "2025 Best Value College" and U.S. News & World Report ranked us the #2 Undergraduate Engineering Program among non-doctorate institutions in its 2025 rankings.

### **The Olin Tuition Scholarship**

The Olin Tuition Scholarship is a merit-based award granted to all admitted students. Covering eight semesters of full-time study, the scholarship honors exceptional achievement both inside and outside the classroom and reflects our belief in your potential to thrive at Olin.

This scholarship is part of our broader commitment to access and excellence, designed to attract ambitious, mission-driven students who are ready to make a positive impact in the world and to help make an Olin education possible for them.

### **Need-Based Aid at Olin**

In addition to the Olin Tuition Scholarship, the College is committed to meeting full demonstrated financial need for up to eight semesters of required full-time study, provided students apply by the appropriate deadlines and are eligible for assistance.

Eligibility for need-based aid is determined through the Free Application for Federal Student Aid (FAFSA). At this time, need-based aid is available to U.S. Citizens and Eligible Non-Citizens.

## Programs of Study and Degree Requirements

---

Electrical and Computer Engineering (ECE) (p. 25)

Engineering (p. 26)

Mechanical Engineering (ME) (p. 33)

4+1 Bachelor of Science Degree with Wellesley College (p. 36)

For Babson, Brandeis and Wellesley Students: Engineering Certificate Program (p. 39)

## Curriculum, Goals and Outcomes

### Overview

Our curriculum is based on the idea that engineering starts with people – understanding who we’re designing for, what they value, and where opportunities to create value exist – and ends with people – appreciating the social context of our work and making a positive difference in the world. At Olin, students learn how to envision positive change and also how to realize and deliver that change.

Olin was founded to challenge the models and assumptions of undergraduate engineering education. The traditional curriculum teaches students how to solve problems, but not how to find the right problems to solve, nor how to get their solutions out of the lab and into the world.

At most schools, students spend their first semesters – sometimes years – taking prerequisites in math and science before they do any engineering. These programs discourage many of the students most interested in engineering, people who might have become transformative engineers if they had the chance.

At Olin, students start engineering right away, with three classes in the first semester that provide hands-on experiences in several areas of engineering. Throughout the curriculum, students stay engaged by working on projects connected to real-world challenges. Olin’s integrated curriculum depends upon math and science courses to help students characterize and understand our world and to develop scientific and quantitative analysis tools that facilitate problem solving.

Students also begin to explore the arts, humanities, and social sciences and entrepreneurship in their first year, and directly integrate and apply this learning in all areas of the curriculum. Every student completes an Arts, Humanities and Social Science (AHS) foundation course in their first semester in order to build strong skills in communication and contextual awareness, and continues to develop these skills through self-designed AHS study that might include an AHS concentration and capstone experience. Olin students also take an introductory entrepreneurship course in their first year, where they begin to develop an entrepreneurial mindset and learn the tools that are essential to realizing true and sustainable positive change.

By their senior year, students are ready to solve real problems for companies and communities through engineering capstone experiences (SCOPE and Design Justice Studio (formerly Affordable Design and Entrepreneurship) that draw upon their prior curricular work.

The academic culture at Olin is collaborative. Many of our classes are taught in a studio environment where students have dedicated space, and all classes emphasize classroom activity (not just listening) and cooperative exploration. Students have flexibility to choose projects that align with their interests; faculty act as coaches, mentors and advisors, providing just-in-time instruction and helping student teams find the resources they need.

The curriculum is interdisciplinary. Students in all majors take a common set of classes that connect areas of engineering and integrate math, science, humanities, and social science. In keeping with this interdisciplinary approach, Olin faculty work and teach together. The faculty are organized as a single department that brings together engineers, scientists, mathematicians, arts and humanities faculty, designers, entrepreneurs, and social scientists.

Olin's collaborative culture actively involves its students as partners in the creation and ongoing development of the curriculum. Students serve on nearly all curricular and policy development committees; offer frequent feedback that helps faculty shape current and future courses; and exercise autonomy in their own education by selecting project goals, topics, and methods.

## Program Educational Objective

Olin's academic programs are designed to support the institutional mission of preparing students to become engineering innovators. From a content perspective, the curricular emphases on engineering, analysis, design, and entrepreneurship are specifically aligned with the mission; through these experiences, students acquire facility in identifying needs, generating concepts that are responsive to people's needs, turning those concepts into technically realizable solutions, and marshaling the resources necessary to turn a vision into reality. The general education requirements support the graduation of liberally educated individuals who consider the ethical consequences of their work and create paradigms in which they can use their engineering education to effect positive change.

After graduation, Olin students in the Engineering, Electrical and Computer Engineering and Mechanical Engineering programs will demonstrate attainment of the following objectives:

- Graduates strengthen the teams and communities they are part of by cultivating collaboration, effective communication and leadership.
- Graduates apply a multi-disciplinary engineering approach to solving important technical and societal challenges.
- Graduates create value for society through entrepreneurial and design thinking that transforms needs and opportunities into systems, products and solutions.
- Graduates adaptively and independently extend their learning to excel in fields about which they are passionate.

## Student Learning Outcomes

### Olin's Added Learning Outcomes (ALOs)

Olin College of Engineering is committed to preparing graduates who recognize the complexity of the world, appreciate the relationship of their work to individuals, to society and to sustainability, expect to work in diverse and inclusive environments, and are ready to engineer a better future for the world. Olin has for its graduates a vision of the key abilities, skills, and mindsets necessary for success, both in engineering and beyond. The vision has been constructed through careful research and consideration of the engineering practice and competencies necessary to approach emerging technical, environmental, and societal challenges in a global context. This vision is captured in our set of learning outcomes.

What follows are the learning outcomes that are standard for an ABET accredited engineering program, along with added learning outcomes (ALOs) developed at Olin College that help define our curricular vision. Through intentional educational design, the Olin community supports the development of graduates with:

#### Student Outcome 1

**ABET:** an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

**An Interdisciplinary Approach to Solving Problems:** an ability to integrate approaches from the social sciences, arts, humanities, math, the natural sciences and engineering to holistically understand and address complex problems.

## Student Outcome 2

**ABET:** an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

**Foregrounding Needs of Primary Parties:** an ability and inclination to utilize human-centered design techniques to investigate and collaboratively identify needs of primary parties by integrating diverse perspectives, ethics, beliefs, and values when pursuing personal and professional endeavors.

## Student Outcome 3

**ABET:** an ability to communicate effectively with a range of audiences.

**Empathic Listening:** an ability to actively listen to others to comprehend the meaning, emotions, and perspective of others.

## Student Outcome 4

**ABET:** an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

**Drawing on the Arts, Humanities, and Social Sciences:** an ability to draw on the arts, humanities, and social sciences to shape, reflect on, and critique one's own values, priorities, and ethics.

## Student Outcome 5

**ABET:** an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

**Team Health:** an ability to assess and foster team health by creating and maintaining successful working relationships and identifying & resolving conflict.

**Adopting Processes to Handle Uncertainty and Adversity:** an ability to structure and sequence tasks to derisk and reduce uncertainty, continuously evaluate project progress, replan when faced with adversity, and iterate as needed.

## Student Outcome 6

**ABET:** an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

**Additional Modes of Analysis:** an ability to select and use appropriate methods of analysis, such as qualitative/mixed methods or secondary source evaluation

## Student Outcome 7

**ABET:** an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

**Self-Regulated Learning:** an ability to diagnose learning needs, set learning goals, identify learning resources, select learning strategies, and self-evaluate and reflect on learning outcomes.

## Student Outcome 8

*Note: there is no corresponding ABET outcome*

**Identity Development and Growth:** an ability and inclination to actively reflect on one's background, personal experiences, and professional work and integrate them into one's evolving sense of self.

## Graduation Requirements

All students must complete a minimum of 120 credits, and must maintain a minimum cumulative GPA of 2.0 in order to graduate from Olin.

Students must satisfy two classifications of requirements to graduate from Olin: General Requirements and Program-Specific Requirements. General requirements must be satisfied by all students regardless of degree or concentration. Program-Specific Requirements vary depending on the degree being sought (ECE, ME or E) and, for the E degree, on the chosen concentration.

General Requirements and Program-Specific Requirements are further broken down into Distribution Requirements and Course Requirements, both of which must be satisfied.

Distribution Requirements specify the minimum total number of credits that must be completed in each of five broad areas (Engineering, Math, Science, AHS and Entrepreneurship). Course requirements specify which courses must be completed. Some course requirements can be satisfied only by completing a particular course. Other course requirements allow more choice. Some courses may be used to satisfy one of several course requirements, but students must choose only a single requirement to be satisfied by each course.

A course completion can satisfy only one course requirement.

## General Distribution and Course Requirements

The required minimum of 120 credits must be appropriately distributed among five areas of study. The table below gives the minimum credits required in each area.

<b>Area</b>	<b>Minimum Credits Required</b>
Engineering	46; where the QEA 1, 2, and 3 course sequence contribute 2 engineering credits
Math and Science	30; of which at least 10 must be Math; where the QEA 1, 2, and 3 course sequence contribute 6 math credits and 4 science credits
AHS and Entrepreneurship	28; of which at least 12 must be AHS

A credit corresponds to an average of three hours of student work each week throughout an academic semester. Therefore, a four-credit course (the most common course size at Olin) generally requires students to spend 12 hours each week attending classes, completing homework, participating in laboratory activities, and fulfilling all other course responsibilities.

The course catalog lists, for each course, the number of credits earned and their area. Most courses provide credit in only one area. Some courses distribute their credits across more than one area. Students must register for at least 12 credits but no more than 20 credits each semester. Students typically register for 16 credits per semester. First year students are limited to 18 credits in the first semester. Some activities, like Passionate Pursuits and a few classes, provide non-degree credit, which appears on the transcript, but do not count toward minimum credit requirements. Non-degree credit counts toward the maximum credits per semester, but not toward the minimum.

### General Course Requirements

All Olin students, regardless of degree or concentration, must satisfy the following course requirements. Students are strongly encouraged to complete all required 1000 level courses prior to the start of their junior year. Note: some courses are required to be taken during a specific semester/year of study while others are suggested.

*Designated alternatives are identified in the registration materials as course numbers ending in 88 or 88A. A designated alternative may also be part of a Curriculum Innovation Experiment or Prototype (CIE) and described in a CIE##### course description.*

#### Modeling Foundation

MTH1111	Modeling and Simulation of the Physical World	2 MTH
SCI1111	Modeling and Simulation of the Physical World	2 SCI

#### Mathematics Foundation

Foundational mathematics content in the following areas is required of all students: linear algebra, multivariable calculus, and probability and statistics.

For students studying Electrical and Computer Engineering, Engineering with a concentration in Robotics, and Mechanical Engineering, additional foundational mathematics content in ordinary differential equations is required.

The interdisciplinary three course sequence titled Quantitative Engineering Analysis delivers the content areas of linear algebra, ordinary differential equations, and multivariable calculus, along with the physics foundation requirement. Each course in the sequence blends mathematical content, physics content and engineering content and as such, a minimum of the first two courses in the full sequence must be completed in order to satisfy the foundational content required for all students. Each course builds on content from the previous and thus successful completion is a prerequisite to move on in the sequence.

In the event that the sequence cannot be completed, the following minimum content guide will provide alternative direction for the remaining content areas. Keep in mind that the interdisciplinary courses are designed to build upon mathematical, science and engineering concepts in a sequential manner.

#### Linear Algebra-Multivariable Calculus

Completion of:	Minimum Requirement Met:	Distribution of Credits Earned:
ENGX2000 (p. 57) Quantitative Engineering Analysis I	Linear Algebra	2 MTH1 SCI 1 ENGR
Quantitative Engineering Analysis 2	Multivariable Calculus	2 MTH1 SCI 1 ENGR

#### Probability and Statistics - One of

*2 credits in Probability and Statistics, satisfied by one of:*

MTH2130	Probability and Statistics	Variable
---------	----------------------------	----------

		Credits MTH
MTH2131	Data Science	2 MTH
MTH2135	Neurotechnology, Brains and Machines	2 MTH
MTH2136	Astronomy and Statistics: AstroStats	2 MTH
MTH2137	Machine Learning or designated alternative	2 MTH

### Science Foundation

Foundation Science content in the following areas is required of all students: Biology, Chemistry or Materials Science, and Physics.

#### Biology Foundation - One of:

The Biology Foundation is satisfied by one of the following courses at the 1000 level or by an intermediate or advanced biology course under the following circumstance:

- Students who successfully completed an AP biology class in high school are automatically eligible to place into an intermediate or advanced biology class. Olin typically offers one or two advanced biology courses per year. Students choosing this option should complete a course waiver form for the foundation biology requirement.

SCI1210	Principles of Modern Biology with Laboratory	4 SCI
SCI1230	Think Like a Biologist with Laboratory	4 SCI
SCI1240	Designing Better Drugs with Laboratory	4 SCI
SCI1250	Six Microbes that Changed the World with Laboratory	4 SCI
SCI1260	The Intersection of Biology, Art and Technology (IBAT)	4 SCI
	OR	
	An intermediate or advanced biology course	

To engage in advanced biology courses, please see courses in the SCI2200-SCI3299 range of numbers.

Note: Students may take more than one course in the SCI1210 through SCI1299 number sequence, as these courses include a significant amount of non-overlapping content and learning experiences. The first course taken by a student may satisfy the biology foundation Course Requirement, and the second class may earn credit towards the MTH/SCI Distribution Requirement, and may also be included in a Bioengineering Plan of Study.

#### Chemistry/Materials Science Foundation - One of:

*4 credits in Chemistry or Materials Science, satisfied by one of:*

SCI1310	Introduction to Chemistry with Laboratory	4 SCI
SCI1320	Paper Panacea: Part I with Laboratory	4 SCI
SCI1399	Special Topics in Chemistry	Variable Credits SCI
SCI1410	Materials Science and Solid State Chemistry	4 SCI
SCI1420	Metals, Mining, and the Environment	4 SCI
SCI1430	Plastic Planet	4 SCI
SCI1440	Materials Creation, Consumption, and Impact	4 SCI
SCI2310	Environmental Analysis & Science or designated alternative	4 SCI

#### Physics Foundation - all of:

*Minimum of 2 credits in Physics, satisfied by the completion of the Quantitative Engineering Analysis 1 and 2\*.*

*\*Electrical and Computer Engineering and Mechanical Engineering majors will have additional foundational physics requirements.*

ENGX2000	Quantitative Engineering Analysis 1	2 MTH, 1 SCI,
----------	-------------------------------------	---------------

ENGX2006	Quantitative Engineering Analysis 2	1 ENGR 2 MTH, 1 SCI, 1 ENGR
----------	-------------------------------------	-----------------------------------

## Engineering

### Engineering Foundation - All of:

ENGR1125	Introduction to Sensors, Instrumentation and Measurement	4 ENGR
ENGR2110	Principles of Integrated Engineering	4 ENGR

### Engineering Capstone - One of:

Eligible students will receive a detailed questionnaire from the capstone directors early in the spring semester before the capstone activity begins. Based on this student information, students will be assigned to DJS (formerly ADE) or SCOPE or a designated alternative (if available).

Each option is a two-consecutive-semester course requirement, totaling 8 credits.

ENGR4190	SCOPE: Senior Capstone Program in Engineering	4 ENGR
	OR	
ENGR4290	Design Justice Studio Capstone (formerly ADE)	4 ENGR
	OR	
	Designated alternative	

**Subtotal: 8**

## Design

### Design Foundation - All of:

ENGR1200	Design Nature	4 ENGR
ENGR2250	Collaborative Design	4 ENGR

ENGR1200, Design Nature is offered in the fall semester and is required to be taken by all first semester, first year students.

ENGR2250, Collaborative Design is offered in the spring semester and is required to be taken by all second semester, second year students.

### Design Depth Course - One of:

The approved design depth courses listed below adhere to four criteria: 1) focus on a major theme in design thinking covered at an advanced level, 2) involve substantial theoretical consideration of design principles, processes or methods, 3) present the theme and theoretical consideration at an interdisciplinary level covering material that is relevant and accessible to multiple disciplines, and 4) provide substantial project experience that aims to create an artifact such as a component, process or system to meet needs, demonstrate possibilities or offer critique.

ENGR3210	Sustainable Design	4 ENGR
ENGR3220	Human-Computer Interaction	4 ENGR
ENGR3232	Biomedical Device Design	4 ENGR
ENGR3235	Biomimicry	4 ENGR
ENGR3240	Tell the Story of What You Make	4 ENGR
ENGR3242	Quantitative Engineering Design	4 ENGR
ENGR3252	Technology, Accessibility, and Design	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3290	Design Justice Studio (formerly ADE) or an approved ENGR3299 Special Topics in Design Engineering course-see registration materials	4 ENGR

*The design depth course chosen above may not be also used in a major plan of study.*

## AHS and Entrepreneurship

Students complete an AHS foundation, an Entrepreneurship foundation, and either a concentration in AHS or a concentration in Entrepreneurship.

### AHS Foundation - One of:

AHSE1100	History of Technology: A Cultural & Contextual Approach	4 AHSE
AHSE1122	The Wired Ensemble -Instruments, Voices, Players	4 AHSE
AHSE1135	The Digital Eye: Photography, Vision, and Visual Communication	4 AHSE
AHSE1148	Dirt to Shirt: Global Garments in Context	4 AHSE
AHSE1155	Identity from the Mind & the Brain: Who Am I and How Do I Know	4 AHSE
AHSE1160	Democracy and Media	4 AHSE
AHSE1170	Infrastructure Studies	4 AHSE
AHSE1180	Inform Demystify Empower: Intro Science Communication	4 AHSE
AHSE1199	Arts, Humanities, Social Science Foundation Topic	4 AHSE

All AHS foundation courses offer:

- an introduction and overview of an AHS discipline
- writing instruction and practice
- an introduction to contextual and critical thinking
- examples of how to integrate content and perspectives of different disciplines.

### Entrepreneurship Foundation

AHSE1515	Products and Markets	4 AHSE
----------	----------------------	--------

*AHSE1515 Products and Markets is required in the first year, second semester (spring only) for all students.*

### AHS or Entrepreneurship Concentration

Students may choose to concentrate in AHS or Entrepreneurship. An AHS/Entrepreneurship concentration is a 12 credit sequence of approved courses that coherently explore a chosen discipline or a disciplinary or interdisciplinary topic.

AHS and Entrepreneurship concentration courses are drawn from offerings at Olin, Wellesley, Babson, or other approved institutions. Concentrations that contain AHS courses often include a four credit AHS Capstone Project, AHSE4190 (p. 52). Concentrations that contain Entrepreneurship courses often include Entrepreneurial Project course work in AHSE2515 (p. 51), Iterate, or in AHSE3515, Launch.

Independent study and research credits (ISR) cannot be included in AHS or Entrepreneurship concentrations.

## Academic Programs

The curriculum is designed to provide technical depth in the areas most relevant to students' program of study. Every student learns about software, electronics and mechanical systems, and every student works on interdisciplinary projects.

Our degree programs are designed to complement common experiences with specialization and technical depth. Olin offers ABET accredited degrees in Electrical and Computer Engineering (ECE) (p. 25), Mechanical Engineering (ME) (p. 33) and Engineering (E) (p. 26), a flexible degree program that lets students choose or create an area of concentration.

### Electrical and Computer Engineering (ECE)

The ECE major provides advanced opportunities for students to analyze, design, and build computing and communication systems. Students apply the principles of linear systems, circuit theory, microelectronics, computer architecture, communication theory, software engineering and signal processing to understand and build these systems.

**The Course Requirements of the ECE program are:****ECE - All of:**

ENGX2011	Quantitative Engineering Analysis 3	2 MTH, 2 SCI
ENGX2134	Engineering Systems Analysis	2 ENGR
ENGR2410	Engineering Systems Analysis: Signals OR or designated alternative	2 ENGR
ENGR2420	Intro Microelectronic Circuits with laboratory	4 ENGR
ENGR2510	Software Design or approved substitutions	4 ENGR
ENGR3410	Computer Architecture	4 ENGR

ENGR2410 (p. 55), Engineering Systems Analysis: Signals has a required corequisite of ENGX2134: Engineering Systems Analysis

Approved substitutions for ENGR2510 (p. 56), Software Design are: Complexity Science (p. 67), Software Systems (p. 66). These are all advanced-level E:C courses with a software design experience that is comparable in scope to the one in Software Design.

**ECE - One of:**

ENGR3415	Digital Signal Processing	4 ENGR
ENGR3420	Intro Analog and Digital Communication	4 ENGR

**ECE - One of:**

ENGR3370	Controls	4 ENGR
ENGR3390	Fundamentals of Robotics	4 ENGR
ENGR3392	Robotics Systems Integration	4 ENGR
ENGR3415	Digital Signal Processing	4 ENGR
ENGR3420	Intro Analog and Digital Communication	4 ENGR
ENGR3426	Mixed Analog-Digital VLSI	4 ENGR
ENGR3430	Electronics	4 ENGR
ENGR3499	Special Topics in Electrical & Computer Engineering	Variable Credits ENGR

ENGR35XX any level 3000 or higher E:Computing course  
or other approved course by ECE faculty for the ECE  
major

*ENGR3415, ENGR3420: if not used above*

**ECE Math**

MTH2110	Discrete Math: Combinatorics and Graph Theory	4 MTH
---------	---	-------

**Engineering**

The Engineering degree program gives students the option to pursue new areas of engineering and interdisciplinary combinations of engineering and other fields. Each student in the Engineering degree program designs a concentration that has depth, breadth, coherence, and rigor and also satisfies the Olin College graduation requirements. All paths to graduation with the Engineering degree provide for all outcomes required by the ABET General Criteria.

Students submit a plan of study when they declare a major. The plan lists the courses the student intends to take to fulfill graduation requirements, and demonstrates that these courses (along with additional required courses) constitute a major in engineering that has depth, breadth, coherence, and rigor.

A set of predefined concentrations in Bioengineering, Computing, Design, Robotics, and Sustainability are provided below. Students may design their plan of study using one of these predefined concentrations or may create a new concentration that addresses their own interests. Students choose a name for their Design, and self-designed concentrations. This concentration name appears on the diploma but not on the official transcript.

The plan of study must be signed by the student's advisor and two faculty members whose area of expertise is relevant to the proposed area of study (if the advisor's area is relevant, the advisor can count as one of the two).

Plans of study are reviewed by faculty and follow this criteria:

- Do the proposed courses constitute a major in Engineering that has breadth, depth, coherence and rigor?
- Do the faculty who approved the plan have relevant expertise? Should other faculty be consulted?
- Is the plan feasible based on a reasonable forecast of course offerings? The availability of faculty and other resources determines which classes are offered and their schedule, which may limit a student's ability to complete a particular concentration.
- Is the plan comparable to the sample concentrations and previous student-designed concentrations? Additionally, when a student-designed concentration is named, is the proposed name accurate and appropriate?

All course plans go through the same review process whether they are modeled after one of the sample concentrations or self-designed. The plan of study is provisional. If approved and completed, a student may use it to graduate.

### **Engineering: Bioengineering (E:Bio)**

Bioengineering (also called Biomedical Engineering) is a broad field. As such, the concentration is meant to be an interdisciplinary one, rooted in engineering problem solving and a deep understanding of biology. Bioengineering subspecialties include areas such as medical devices, biomechanics, assistive technology, bioinformatics, cell and tissue engineering, neurotechnology, computational biology, drug delivery, medical imaging, and many more. The Engineering major with a concentration in Bioengineering (E:Bio) prepares students to approach problems important to biology, medical research, and clinical studies, regardless of the subspecialty they choose to pursue. Note that some students interested in Bioengineering will take Bioengineering-relevant courses while pursuing another concentration (i.e. Mechanical Engineering, Computing, or Electrical and Computer Engineering).

Students wishing to pursue the E:Bio concentration should develop a program of study in consultation with bioengineering faculty. As Bioengineering encompasses many subspecialties, students develop a course plan that supports their area of study. E:Bio course plans may include classes at Babson, Brandeis, Wellesley, or other institutions.

Some of the courses that may be included in an E:Bio course plan are listed below. Students must take at least 4 credits of advanced Math and advanced Biology in addition to at least 16 credits of relevant Bioengineering courses.

#### **E:Bio Bioengineering**

Sixteen credits of coursework appropriate to the Bioengineering program of study form the core of a BioE focus. These courses may have the designation of 36xx (the Bioengineering prefix) but do not need to do so. They do not all need to be ENGR courses; however all students do have to meet the minimum number of engineering credits required for graduation. Relevant SCI (advanced Biology, relevant Physics, Chemistry), Mechanical Engineering, Electrical Engineering, and Computing courses that build relevant skills can be used for certain Bioengineering subspecialties.

Example courses include, but are not limited to:

(note: courses not hyperlinked are offered at Wellesley College)

ENGR2330	Introduction to Mechanical Prototyping	4 ENGR
ENGR2510	Software Design	4 ENGR
ENGR3232	Biomedical Device Design	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3520	Foundations of Computer Science	4 ENGR

ENGR3699	Special Topics in Bioengineering	Variable Credits ENGR
ENGR3635	Neurotechnology, Brains and Machines	2 ENGR
MTH2135	Neurotechnology, Brains and Machines	2 MTH
BISC303	Bioinformatics	4 SCI
CS313	Computational Biology	4 ENGR

### **E:Bio Advanced Biology**

Four credits of advanced Biology appropriate to the program of study, examples include, but are not limited to:

(note: courses not hyperlinked are offered at Wellesley College)

SCI2210	Immunology	4 SCI
SCI2214	Microbial Diversity	4 SCI
SCI2215	Emerging Technologies in Cancer Research, Diagnosis and Treatment w/ Lab	4 SCI
SCI2299	Special Topics in Biological Sciences	Variable Credits SCI
BISC203	Comparative Physiology and Anatomy of Vertebrates with Laboratory	4 SCI

SCI2299 Special Topics in Biological Sciences offerings may be used as advanced biology by petition only (often the registration materials will specify if it will satisfy; otherwise students should petition to have it count via their plan of study).

### **E:Bio Math**

A course in advanced Mathematics appropriate to the program of study, examples include, but are not limited to:

MTH2110	Discrete Math: Combinatorics and Graph Theory	4 MTH
MTH2131	Data Science	2 MTH
MTH3120	Partial Differential Equations	4 MTH

### **Engineering: Computing (E:C)**

The Computing concentration integrates the study of computer science and software engineering within a broad interdisciplinary context. The E:C concentration offers significant flexibility, particularly with courses taken off-campus.

#### **E:Computing - All of:**

ENGR2510	Software Design	4 ENGR
ENGR3525	Software Systems	4 ENGR
	AND	
	One of:	
ENGR3515	Data Structures and Algorithms	4 ENGR
ENGR3520	Foundations of Computer Science	4 ENGR

or approved substitutions

#### **E:Computing Electives**

Eight additional credits in computing, examples include:

ENGR3220	Human-Computer Interaction	4 ENGR
ENGR3410	Computer Architecture	4 ENGR
ENGR3515	Data Structures and Algorithms	4 ENGR
ENGR3520	Foundations of Computer Science	4 ENGR
ENGR3540	Complexity Science	4 ENGR
ENGR3590	Computational Intro to Robotics	4 ENGR

ENGR3599	Special Topics in Computing	Variable Credits ENGR
	advanced computer courses at Babson, Brandeis, Wellesley, or study away institutions by petition	

You may use ENGR3515 (p. 66) or ENGR3520 (p. 66) as an elective if not used in the Core Requirements above.

### **E:Computing Math**

MTH2110	Discrete Math: Combinatorics and Graph Theory	4 MTH
---------	---	-------

### **Engineering: Design (E:D)**

E:Design is an interdisciplinary concentration emphasizing synthesis, processes, and methods of practice that blends engineering and Arts, Humanities, Social Sciences, and Entrepreneurship (AHSE). The E: Design concentration prepares students to address important societal and environmental needs through design thinking.

E:Design students work closely with the design faculty at Olin to define individually customized programs of studies that meet Olin credit requirements. It remains the student's responsibility to ensure that their program of study also meets the requirements for graduate programs or professional practice.

Courses used by a student to meet the Design General Requirements, such as the Design Depth requirement, may not simultaneously be used to meet the E:Design or E:Design Electives requirements.

E:Design Elective courses may be drawn from any area including AHSE, Engineering, Science, or Math. Students are strongly recommended to consider one or more AHSE courses to meet this requirement. Design Research may be accomplished through an Independent study course advised by design faculty. Design Research may count toward the E:Design requirement with approval by design faculty.

E:Design courses may be drawn from cross registration or study away institutions with prior approval by design faculty. Note that courses at design schools will often meet the E:Design Electives requirement and not the E:Design requirement.

All E:Design programs of study should be consistent with the student's educational goals and must contain sufficient depth, breadth, coherence, and rigor. Each E:Design concentration must have an approved title consistent with the area of design represented by the coursework in the program of study. All programs of study must receive prior approval by design faculty.

All E:Design programs of study must fulfill the General Graduation Requirements.

#### **E:Design**

Eight credits of approved Intermediate or Advanced Design courses; four credits may be met by Design Research

#### **E:Design Electives**

Sixteen credits of approved coursework appropriate to the program of study

### **Engineering: Robotics (E:Robo)**

E:Robo is an interdisciplinary engineering concentration that prepares students to design, construct, operate, and apply robots and computer systems to challenging automation problems drawn from diverse application spaces. Students will build a strong technical foundation with an emphasis on robotics ethics and the fusion of electrical, software, and mechanical engineering, and have the opportunity to pursue sub disciplinary interests in, among other areas, actuation, control, artificial intelligence, sensory feedback and perception, information processing, and technology integration.

E:Robo students will work with robotics faculty members to develop a specific program of study that contains a statement of goals that identifies a sub disciplinary area of focus and outlines sufficient course material to support those goals.

**E:Robotics Foundation**

All of the following:

ENGR3390	Fundamentals of Robotics	4 ENGR
ENGR3590	Computational Intro to Robotics	4 ENGR

**E:Robotics-Software**

Four (4) credits of coursework in software from the following options:

ENGR2510	Software Design	4 ENGR
ENGR3515	Data Structures and Algorithms	4 ENGR
ENGR3525	Software Systems	4 ENGR
ENGR3560	Scientific Computing	4 ENGR

Other computing courses may be substituted if approved on a plan of study by a robotics faculty.

**E:Robotics - Mechanical**

Four (4) credits of coursework in mechanical engineering from the following:

ENGX2134	Engineering Systems Analysis	2 ENGR
	AND	
ENGR2340	Engineering Systems Analysis: Dynamics	2 ENGR
ENGR2330	Introduction to Mechanical Prototyping	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3330	Mechanical Design	4 ENGR

Other mechanical engineering courses may be substituted if approved on a plan of study by a robotics faculty.

Students who have taken ENGR2410, ESA: Signals can use that as a substitute for ENGR2340, ESA: Dynamics

**E:Robotics Electives**

Eight (8) additional credits in robotics depth courses from the following:

ENGR2330	Introduction to Mechanical Prototyping	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3330	Mechanical Design	4 ENGR
ENGR3370	Controls	4 ENGR
ENGR3392	Robotics Systems Integration	4 ENGR
ENGR3430	Electronics	4 ENGR
ENGR3515	Data Structures and Algorithms	4 ENGR
ENGR3525	Software Systems	4 ENGR
ENGR3537	Machine Learning	2 ENGR
ENGR3560	Scientific Computing	4 ENGR
ENGR3997	Directed Research in Robotics	Variable Credits ENGR
ENGR3999	Special Topics in Robotics	Variable Credits ENGR
ENGR33XX	any level 3000 or higher ME course	
ENGR34XX	any level 3000 or higher ECE course	
ENGR35XX	any level 3000 or higher E:Computing course	

Courses listed above cannot be used as an elective if used in another category of E:Robotics requirements, e.g., ENGR3330 can be used in **either** the E:Robo Mechanical requirement or the E:Robo Electives requirement, but not both.

Any 3000+ level E:C, ECE, or ME course with approval from robotics faculty  
(courses represented above as ending in XX)

### **E:Robotics Applied Mathematics**

Four (4) credits of advanced Applied Mathematics appropriate to the program of study.

ENGX2011	Quantitative Engineering Analysis 3	2 MTH, 2 SCI
MTH2110	Discrete Math: Combinatorics and Graph Theory	4 MTH
MTH3120	Partial Differential Equations	4 MTH
MTH2135	Neurotechnology, Brains and Machines AND	2 MTH
ENGR3635	Neurotechnology, Brains and Machines	2 ENGR
MTH2137	Machine Learning AND	2 MTH
ENGR3537	Machine Learning	2 ENGR
MTH3XXX	any level 3000 or higher Mathematics course	

### **Engineering: Sustainability (E:Sust)**

E:Sust is an interdisciplinary concentration that embraces a broad definition of sustainability to prepare students for a wide range of personal and professional pathways. Sustainability is an inherently transdisciplinary field, drawing on engineering and science as well as social sciences, humanities, business, and the arts for various aspects of sustainability practice.

E:Sust students work closely with sustainability faculty at Olin to define individually customized programs of studies that meet Olin credit requirements. It remains the student's responsibility to ensure that their program of study also meets the requirements for graduate programs or professional practice.

*Courses used by a student to meet the General Requirements may not simultaneously be used to meet the E:Sust concentration-specific requirements.*

E:Sust courses may be drawn from cross-registration or study away institutions with approval by the CSTB, in consultation with sustainability faculty.

As with all Engineering programs of study, E:Sust programs of study should be consistent with the student's educational goals and must contain sufficient depth, breadth, and coherence. All programs of study must receive approval by the ARB, in consultation with sustainability faculty.

*All E:Sust programs of study must fulfill the General Graduation Requirements.*

### **E:Sustainability Requirements Overview**

E:Sust programs of study require a four-credit introductory sustainability course, four credits of advanced sustainability coursework, and sixteen credits of approved elective coursework.

Sustainability coursework is defined for the purposes of this concentration as having a substantial component of sustainability theory and/or methods, or as having a substantial component addressing one or more of the UN Sustainable Development Goals (UN SDGs).

### **E:Sust Introductory**

An introductory course as noted in the registration materials.

### **E:Sust Advanced**

Coursework will be approved as "advanced" by the ARB in consultation with sustainability faculty. Advanced coursework generally adheres to four criteria in addition to being upper-level:

1. The course focuses primarily on one or more major themes in sustainability--involving causes and consequences for human and/or environmental justice, well-being, or flourishing--and covers them at an advanced level.
2. The course involves substantial consideration of sustainability principles, systems, processes, or methods, and/or experiential engagement with the practice of sustainability.
3. The course covers material in a way that is interdisciplinary as well as relevant and accessible to multiple disciplines.
4. The course engages students in reflective sustainability self-awareness, including attention to identity development.

Examples of approved, advanced courses include (but are not limited to):

Course Number	Course Name	Sustainability Elements
ENGR3290 (p. 62)	Affordable Design and Entrepreneurship	Sustainability theory and development; UN SDGs vary by project, includes UN SDGs 1-6, 8-10, 13 and 16
ENGR3235 / SCI2235 (p. 80)	Biomimicry	Sustainability theory; UN SDGs vary by project, includes UN SDGs 9, 11 and 12
AHSE2599 ENGR3299 ENGX2199	Environmental Consulting at Olin	Sustainability theory; UN SDG 13 Climate Action
ENGR3180 (p. 59)	Renewable Energy	Sustainability theory; UN SDGs 7 Affordable and Clean Energy, 1 No Poverty, 13 Climate Action, 16 Peace, Justice and Strong Institutions
ENGR3210 (p. 59)	Sustainable Design	Sustainability theory; UN SDGs vary by project, includes UN SDGs 1-5 and 8-16

### **E:Sust Electives**

Sixteen credits of approved elective coursework should support the depth, breadth, and coherence of the plan of study; we recommend including four credits of social sciences or humanities along with physical or life sciences or engineering. Electives can include courses that are not primarily centered on sustainability that nevertheless support the student's learning goals in sustainability. E:Sust elective courses may be drawn from any area including Arts, Humanities, Social Science and Entrepreneurship, Engineering, Science, or Math, and may include up to four credits of research with a sustainability faculty member as the research advisor or disciplinary advisor. Courses counted as E:Sust electives cannot be double-counted for other graduation requirements.

Examples of elective courses include advanced courses taken in addition to the advanced requirement (outlined above) and the following courses:

Course Number	Course Name	Sustainability Elements
MTH2188A / SCI2099A	Decision-Making in Sustainable Systems	Sustainability theory; systems thinking; applications to UN SDGs of students' choice
SCI1399	Paper Panacea	Sustainability theory; holism; system dynamics principles; transformational action; UN SDGs 3 Good Health and Well-Being, 5 Gender Equality, 10 Reduced Inequalities, 17 Partnership for the Goals
SCI1420 (p. 78)	Metals, Mining, and the Environment	Sustainability theory; UN SDGs 6 Clean Water and Sanitation, 8 Decent Work and Economic Growth, 9 Industry, Innovation and Infrastructure, 10 Inequalities, 12 Responsible Consumption and Production, 15 Life on Land
SCI1430 (p. 78)	Plastic Planet	Sustainability theory; UN SDGs 6 Clean Water and Sanitation, 8 Decent

		Work and Economic Growth, 9 Industry, Innovation, and Infrastructure, 10 Reduced Inequalities, 12 Responsible Consumption and Production, 14 Life Below Water
SCI1440 (p. 79)	Materials Creation, Consumption, and Impact	Sustainability theory; UN SDGs 6 Clean Water and Sanitation, 8 Decent Work and Economic Growth, 9 Industry, Innovation, and Infrastructure, 10 Reduced Inequalities, 12 Responsible Consumption and Production, 14 Life Below Water, 15 Life on Land
ENGR3232 (p. 60)	Biomedical Device Design	UN SDG 3 Good Health and Well-Being
ENGR2141 (p. 53) / AHSE2141 (p. 49)	Engineering for Humanity	UN SDGs 3 Good Health and Well-Being, 10 Reduced Inequalities
AHSE2199	Change the World: Personal Values, Global Impacts and Making an Olin GCSP	Systems theory; UN SDG framework and goals
AHSE2199A	Democracy in Action: Election 2020	UN SDG 16 Peace, Justice and Strong Institutions

## Mechanical Engineering (ME)

Mechanical Engineering majors develop skills in modeling, designing, fabricating, and analyzing thermal, fluid, and mechanical systems. The program aims to empower students to succeed in careers that serve society by cultivating curiosity, empowering students to tackle technical challenges, and providing opportunities to practice ME skills in contexts that matter.

### **The Course Requirements of the ME program are:**

#### **ME - All of:**

ENGX2011	Quantitative Engineering Analysis 3	2 MTH, 2 SCI
ENGR2320	Mechanics of Solids & Structures	4 ENGR
ENGX2134	Engineering Systems Analysis	2 ENGR
ENGR2340	Engineering Systems Analysis: Dynamics	2 ENGR
ENGR2360	Introduction to Thermal-Fluid Systems	4 ENGR
ENGR3330	Mechanical Design	4 ENGR
ENGR3360	Thermal-Fluid Systems Analysis	4 ENGR

#### **ME - One of:**

ENGR3180	Renewable Energy	4 ENGR
ENGR3232	Biomedical Device Design	4 ENGR
ENGR3242	Quantitative Engineering Design	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3345	Mechanical and Aerospace Systems	4 ENGR
ENGR3350	Finite Element Analysis	4 ENGR
ENGR3370	Controls	4 ENGR
ENGR3392	Robotics Systems Integration	4 ENGR
ENGR3820	Failure Analysis and Prevention	4 ENGR

or other course approved by ME program group

*ENGR3225, ENGR3232, ENGR3242, ENGR3260: if not used to satisfy the Design Depth requirement*

**ME Math - One of:**

MTH3120

Partial Differential Equations  
or other math course approved by ME program group

4 MTH

## Other Academic Programs and Opportunities

### Study away program

The Study Away Program provides students with the opportunity to broaden their perspective and views of the world by studying for a semester at another approved academic institution, usually in another country. Olin has an extensive list of approved programs and students must follow Olin's set application process in order to apply for study away. Contact the International Programs Office for additional information.

Study away is limited to one semester and typically takes place during the junior year, unless on an Olin faculty led program. Study away may be approved on a case-by-case basis, with additional steps for approval, for seniors whose final semester takes place in the fall semester. Study away cannot take place in the final spring semester of senior year.

Full-time Study Away (which requires pre-approval) counts as one of the eight scholarship semesters. The student is maintained as full-time at Olin and is expected to pay Olin tuition after the merit scholarship and any additional costs associated with any such activity at the host institution including any tuition exceeding Olin's, room, board and fees if applicable. See the Home School Tuition Policy Statement on the Study Away webpage for more details. For questions about tuition policy contact Student Accounts.

For information about the planning and application process, see [Study Away](#). In order to transfer credits from another institution, students follow procedures described in the academic policy section on Transfer credit (p. 103). Financial assistance may be available to eligible students. Contact the Financial Aid Office for additional information regarding eligibility and procedures.

### Independent study and research

Beginning in a student's second semester, Olin offers many opportunities to engage in independent study and research activities. Independent Study activities give students an opportunity to explore academic topics of interest that are not available in regularly offered classes. Independent Study takes place during the semester. Research activities give students an opportunity to work with faculty on academic research projects, usually initiated by a faculty member. Research can take place both during the academic year and during the summer, though summer research is only available for pay, not credit.

Olin offers two forms of Independent Study or Research activity for credit:

1. An ISR is an Independent Study or Research activity graded on a pass/no credit scale. An ISR cannot be used to satisfy a course requirement (which includes courses used as part of an AHS, Entrepreneurship, Certificate program or Engineering concentration). ISR activities are associated with the following course numbers, based on discipline, or as a generic listing of ISR: AHSE0177, AHSE0577, ENGR0077, MTH0077, SCI0077. ISRs, taken as pass/no credit, do **not** count against the 12 credit limit for choosing pass/no credit grading for an elective course.
2. An ISR-G is an Independent Study or Research activity taken for a letter grade. An ISR-G might be used to satisfy a course requirement, pending approval, which approval must be specifically requested. Graded ISR-G activities are associated with the following course numbers, based on discipline, or as a generic listing of ISR: AHSE0177-G, AHSE0577-G, ENGR0077-G, MTH0077-G, SCI0077-G.

Students may receive 1-4 academic credits per semester for each ISR or ISR-G activity and cannot receive pay for activities which receive credit in the same semester. Students will be productively engaged with an ISR or ISR-G activity for approximately 3 hours per week per credit.

There is no limit on the total number of credits of ISR or ISR-G a student can earn while at Olin. ISR/ISR-G credit is academic credit that counts toward the overall 120 credit requirement. ISR/ISR-G credit may be applied toward credit requirements in Math, Science, AHS, Entrepreneurship, or Engineering, subject to approval by the faculty advisor if the advisor has relevant expertise, or by an additional disciplinary advisor otherwise.

Completed and signed ISR/G forms must be submitted to the Registrar's Office no later than the full-semester ADD Deadline (10 days into the semester). The work can be scheduled between the student and professor in whatever way is mutually agreeable, but the paperwork cannot be submitted later in the semester.

The ISR/ISR-G proposal form is located on the forms page under the Registrar's Office. Proposals are reviewed by the Registrar's Office for completeness and may be referred to the ARB; a proposal might be rejected or returned for revision if it violates policies or guidelines.

## Research Thesis

The Research Thesis Option enables students with research experience to work closely with an Olin faculty mentor to further develop and formalize their research skills. The Research Thesis Option consists of 2 semesters (or equivalent) of focused research with a faculty advisor and culminates in a thesis document written by the student and a presentation to the thesis committee. Enrollment in the thesis option is by thesis advisor approval, and not all faculty members are available to supervise research theses. Students accepted into the program will be enrolled in ISR-G Thesis Research for 4 credits in Semester 1 and ISR-G Thesis for 4 credits in Semester 2. Full-time summer research may substitute for a semester of ISR-G Thesis with faculty approval. Completion of the Research Thesis Option is subject to approval by your faculty advisor and committee and will be noted on the student transcript.

### Semester 1 Activities: Thesis Research

During semester one, you should be engaging in research activities in collaboration with your research advisor. In addition, you will begin formalizing the plan for your research thesis. Note that a thesis proposal is an evolving document that is based on preliminary research, and should be updated as your project progresses.

1. Thesis Proposal: Develop a 3-4 page document that describes what you plan to accomplish for your thesis. Provide enough background for your committee to understand your proposed plan, include any preliminary data if available, and include a timeline towards Thesis completion.
2. Committee Meeting: By the 33rd instructional day, schedule a meeting with your Thesis committee to review your proposal. Your committee will provide feedback for your proposal. Once your proposal is approved, you can register for Semester 2 of the Thesis, continue to work on your thesis research, and plan your written Thesis document.

### Semester 2 Activities: Thesis

1. Thesis Writing: Develop your written Thesis document. Please consult your Thesis adviser for suggested formats. You can also find past theses on the Olin Phoenix files for inspiration.
2. Thesis Presentation: Schedule a presentation with your committee to take place by the finals exams period during the Spring semester. You will make a presentation of your Thesis research and the committee will review and provide feedback for your final Thesis written document. While you are only required to present to your committee, we encourage you to have a public presentation and invite the Olin community in addition to your committee. You are also encouraged to present your thesis at other community events such as EXPO.
3. Thesis Document: Finalize your written Thesis document incorporating suggestions from your Thesis Committee. Your final thesis will be archived with the Olin Library.

## Student led courses

Student Led Courses (SLCs) embody Olin's emphasis on team teaching and student-directed learning by enabling two or more students to work with Olin faculty as student teachers of a Special Topics course. These student teachers design and deliver their course to other students who receive up to four academic credits and a pass/no credit, EG, or ABCDF grade at the instructors' discretion. SLCs may not duplicate existing course offerings. SLCs might fulfill credit or course requirements depending on the topic and grading method.

All SLCs are overseen by faculty advisors who serve as instructors of record. The supervising Olin faculty members assign final grades and serve as points of contact for all students taking the course, in order to address concerns or questions. The student teachers receive guidance from the faculty advisors, and also receive Independent Study (ISR-G) credit in recognition of the pedagogical experience that they gain through this teaching experience.

Student teachers and faculty advisors need to submit a proposal and follow additional guidelines prior to offering a SLC. The proposal form and guidelines are available at the Registrar's page.

## Passionate pursuits

A Passionate Pursuit is an intellectual or scholarly activity in which students propose a semester-long project, solicit faculty participation, and establish objectives. Students wishing to enroll in a Passionate Pursuit fill out a proposal form that indicates a title and description of the project, faculty sponsor, learning goals, and list of deliverables (often a presentation or performance) that constitute satisfactory completion of the project.

Successfully completed Passionate Pursuit projects earn non-degree credit, and the title of the project appears on the student's transcript.

## Grand Challenges Scholars Program

Olin's Grand Challenges Scholars Program (GCSP) helps students leverage their educational experiences and participation in the Olin community to galvanize lifelong learning and community participation. The focus of the program is on developing the self ("I"), developing Olin ("we"), and developing the world ("all of us"). The program culminates with the creation of each student's personal vision and mission snapshot, reflecting their identity, values, experiences, and goals to date. Olin's GCSP uses a combination of formal courses and informal experiences to help students grow into their identities, participate in a community of practice, and find a role for themselves in fulfilling Olin's mission of doing good in the world.

## 4+1 Bachelor of Science Degree with Wellesley College

The Olin 4+1 Program offers Wellesley College students an opportunity to obtain a second bachelor's degree in engineering by completing a fifth year of study at Olin. Students enrolled in the 4+1 program begin their engineering study while enrolled at Wellesley; by the time they complete their Wellesley degree, 4+1 students must have completed all math and science prerequisites as well as five foundation courses, listed below. In their fifth year, 4+1 students enroll at Olin and spend both semesters in residence, completing major requirements as well as the engineering capstone.

The Engineering Certificate is not intended to serve as a pathway to the 4+1 Program. While there are some overlapping requirements between these two programs, the 4+1 Program requires an extensive set of course and credit requirements not only in engineering, but also in math and science. Students intending to apply for admission to the 4+1 Program will need to plan their schedules carefully and often take courses at different times compared to Engineering Certificate students.

Admission to the 4+1 program takes place in the student's junior year at Wellesley. Students admitted to the 4+1 program receive the Olin Tuition Scholarship for their year as Olin students, and may apply for additional need-based financial aid. Wellesley students who are admitted to the 4+1 Program must spend two full-time semesters in residence at Olin (living on campus).

## 4+1 Degree Requirements

All students wishing to complete the 4+1 program must fully satisfy Wellesley's degree requirements prior to matriculating at Olin, and must also satisfy specific science, math and engineering requirements. The minimum distribution requirements for the 4+1 Degree are shown in the table below.

Area	Minimum Credits Required
Engineering	46
Math and Science	30
Arts Humanities and Social Science	28
Total credits in all areas	120

## Olin Foundation Courses

Must complete prior to the fifth year (the Olin year)

The listing below contains Olin College courses and some Wellesley College equivalencies. Olin courses begin with MTH, SCI, ENGR, ENGX, AHSE.

MTH1111	Modeling and Simulation of the Physical World AND	2 MTH
SCI1111	Modeling and Simulation of the Physical World OR	2 SCI
	One of:	
CS112	Intro Computing for the Sciences	4 SCI
PHYS205	Thermodynamics & Stat Mechanics with Lab	4 SCI
ENGR1125	Introduction to Sensors, Instrumentation and Measurement OR	4 ENGR
PHYS210/ENGR210	Experimental Techniques	4 SCI
ENGR1200	Design Nature OR	4 ENGR
ENGR160	Fundamentals of Engineering	4 ENGR
ENGR2110	Principles of Integrated Engineering	4 ENGR
ENGR2250	Collaborative Design	4 ENGR

### One of:

AHSE1515	Products and Markets	4 AHSE
AHSE2515	Iterate	4 AHSE

*credits from foundation courses listed above total a minimum of 20; also if AHSE2515 Iterate is selected, it must be taken twice for a total of 4 credits*

## Math and Science Prerequisites

Foundational math and science topics are prerequisites to the 4+1 program. These topics are:

- Linear Algebra
- Differential Equations
- Vector Calculus
- Physical science foundation (e.g. mechanics or electricity and magnetism)
- Biological science foundation
- Chemistry or Materials Science foundation
- Probability and Statistics as appropriate to the engineering major

Successful completion of courses in these topics must be prior to fifth year (Olin year)

The listing below contains Olin College courses and some Wellesley College equivalencies. Olin courses begin with MTH, SCI, ENGR, ENGX, AHSE.

	Biology Foundation (see note 2)	
	Chemistry or Materials Science Foundation (see note 3)	
	Physics Foundation, One of:	
PHYS106 and PHYS106 L	Fund Elec, Magn & Optics w/ Lab	4 SCI
PHYS107	Principles and Applications of Mechanics with Laboratory	4 SCI
<b>Linear Algebra, One of</b>		
PHYS207	Classical Dynamics	4 SCI
	OR	
MATH215	Differential Equations with Applied Linear Algebra	4 MTH
<b>Differential Equations, One of:</b>		
PHYS207	Classical Dynamics	4 SCI
	OR	
MATH215	Differential Equations with Applied Linear Algebra	4 MTH
<b>Vector Calculus, One of:</b>		
PHYS208	Intermediate Electromagnetism	4 SCI
	OR	
MATH205	Multivariate Calculus	4 MTH
<b>Probability and Statistics, One of:</b>		
MTH2130	Probability and Statistics	Variable Credits MTH
MTH2131	Data Science	2 MTH
MTH2135	Neurotechnology, Brains and Machines	2 MTH
MTH2136	Astronomy and Statistics: AstroStats	2 MTH
MTH2137	Machine Learning	2 MTH
BISC198	The Applied Statistics and Data Science in Biology	4 SCI
MATH220	Probability	4 MTH
QR150_STAT150	Intro Data Literacy: Everyday Applications	4 MTH
STAT160	Fundamentals of Statistics	4 MTH
STAT218	Introductory Statistics and Data Analysis	4 MTH

### Design Depth and Engineering Capstone Requirements

In addition to prerequisite course work and Olin foundation courses, all 4+1 students must complete a design depth and engineering capstone requirement.

#### Design Depth Course - One of:

The approved design depth courses listed below adhere to four criteria: 1) focus on a major theme in design thinking covered at an advanced level, 2) involve substantial theoretical consideration of design principles, processes or methods, 3) present the theme and theoretical consideration at an interdisciplinary level covering material that is relevant and accessible to multiple disciplines, and 4) provide substantial project experience that aims to create an artifact such as a component, process or system to meet needs, demonstrate possibilities or offer critique.

ENGR3210	Sustainable Design	4 ENGR
ENGR3220	Human-Computer Interaction	4 ENGR
ENGR3232	Biomedical Device Design	4 ENGR
ENGR3235	Biomimicry	4 ENGR

ENGR3240	Tell the Story of What You Make	4 ENGR
ENGR3242	Quantitative Engineering Design	4 ENGR
ENGR3252	Technology, Accessibility, and Design	4 ENGR
ENGR3260	Design for Manufacturing	4 ENGR
ENGR3290	Design Justice Studio (formerly ADE) or an approved ENGR3299 Special Topics in Design Engineering course-see registration materials	4 ENGR

*The design depth course chosen above may not be also used in a major plan of study.*

### Engineering Capstone - One of:

Eligible students will receive a detailed questionnaire from the capstone directors early in the spring semester before the capstone activity begins. Based on this student information, students will be assigned to ADE or SCOPE.

Each option is a two-consecutive-semester course requirement, totaling 8 credits.

ENGR4190	SCOPE: Senior Capstone Program in Engineering OR	4 ENGR
ENGR4290	Design Justice Studio Capstone (formerly ADE)	4 ENGR

**Subtotal: 8**

### Major Requirements

Choose one of the three Olin majors, Electrical and Computer Engineering (p. 25), Engineering (p. 26) or Mechanical Engineering (p. 33) and follow the degree requirements as outlined.

*It is expected that an Olin major will be comprised of Olin engineering, or related courses. However, if approved, a maximum of two courses (or eight credits) may be transferred from another institution (Wellesley or other).*

### Notes regarding equivalences and terms

1. Credit Equivalences between Wellesley and Olin: 1 or 1.25 Wellesley Units = 4 Olin Credits
2. See the College Catalog for the list of options of biology foundation courses, typically in the SCI1210 through SCI1299 sequence; alternatively an applicant may petition for a Wellesley equivalent
3. See the College Catalog for the list of options of chemistry and materials science foundation courses; alternatively an applicant may petition for a Wellesley equivalent

For more information on the admission process for the 4+1 Program, see the Olin College Admission page.

## For Babson, Brandeis and Wellesley Students: Engineering Certificate Program

Olin offers a Certificate in Engineering Studies for students at Wellesley College, Babson College, and Brandeis University who wish to gain a foundation in engineering content, skills, and perspectives, as well as some depth in one engineering field. The structure of this certificate gives students the flexibility to create course plans that meet their interests and needs.

To earn a certificate, the student must complete five Olin courses (four credits each) that must be taken for a letter or “EG” grade. Each student proposes their own set of five courses, which must satisfy the requirements below, and must be approved by Olin faculty.

### Engineering Certificate Program Goals and Requirements

Olin’s engineering certificate program has four overarching goals:

1. Provide a **foundation** to engineering concepts and practices. This goal is normally achieved by completing one foundation course from the list below.
2. Explore the **depth** of an engineering subject, field, or topic. This goal is achieved by proposing and completing a set of three depth courses as described below.
3. Experience Olin’s **broader approach to engineering**, which includes projects, teamwork, user-centered design work, and interdisciplinary integration.

4. Choose a set of classes that achieve a reasonable degree of **coherence**. This goal is achieved if the student can articulate how the courses build upon each other and collectively achieve an outcome that is important to the student.

### Foundation course

Choose one of, totaling a minimum of 4 credits

ENGR1125	Introduction to Sensors, Instrumentation and Measurement	4 ENGR
ENGR1200	Design Nature	4 ENGR
ENGR2250	Collaborative Design	4 ENGR

MTH1111	Modeling and Simulation of the Physical World AND	2 MTH
---------	--	-------

SCI1111	Modeling and Simulation of the Physical World	2 SCI
---------	---	-------

*standard fall offerings: ENGR1200, MTH1111 and SCI1111*

*standard spring offering: ENGR1125, ENGR2250*

### Depth courses (three courses, for 12 credits)

Each Engineering Certificate student proposes a set of three depth courses (12 credits total) that relate to a common theme (for example, design, mechanical engineering, human computer interaction). These courses must receive engineering (ENGR) credit.

Students can include one or more foundation courses, listed above, as depth courses. However, if a course is used to satisfy the foundation requirement, it cannot also be used as a depth course.

### Elective (one course, for four credits)

Each student chooses a fifth course that is meaningful to them, and develops the depth or coherence of their plan.

### Prerequisites and Expectations

Most Olin College engineering courses have general math and science prerequisites that are typically taken at the student's home institution, and students should check with instructors prior to registration to verify their readiness for each course.

In addition, Olin courses often have significant project components and require considerable team based work. Non-Olin students should be prepared to work closely with their Olin counterparts, both inside and outside class.

### Credit for Courses Taken at Home Institution

A **maximum of one course** from a student's home institution may substitute for an Olin course, provided it covers equivalent material. This substitution has no bearing on whether or not it is used to satisfy other requirements at the home institution. A student should petition for this course substitution early in their program by contacting the Olin College Registrar.

The following course substitutions have been pre-approved:

- Wellesley College students may elect to transfer ENGR160 from Wellesley to satisfy Olin's ENGR1200 (p. 53), Design Nature.
- Babson College students enrolling in EPS4515 at Babson may count their home course of Olin's ENGR3290 (p. 62) Design Justice Studio towards the Certificate.
- Brandeis University students may substitute PHYS29A Electronics Lab I to satisfy Olin's ENGR1125 (p. 52), Introduction to Sensors, Instrumentation and Measurement.

### Enrollment and Completion of the Engineering Certificate Program

Students who wish to enroll in the Engineering Certificate Program must submit a Certificate Program Enrollment Form to the Olin Registrar's Office after they have completed their first course at Olin and before taking additional courses.

The form must be signed by the student's advisor at their home institution, as well as the Olin certificate advisor. After the proposed plan is approved, any subsequent changes must be approved by the Olin certificate advisor. A certificate can only be awarded if the student has completed an approved plan.

### Note Regarding the 4+1 Program with Wellesley College

The Engineering Certificate is not intended to serve as a pathway to the 4+1 Program. While there are some overlapping requirements between these two programs, the 4+1 Program requires an extensive set of course and credit requirements not only in engineering, but also in math and science. Wellesley students in the Engineering Certificate Program intending to apply for the 4+1 Program should review the requirements and suggested course plans for both programs carefully to ensure they have completed all the necessary requirements for the year in residence at Olin.

# Courses, Credits, Hours

---

## Availability of Offerings

Information in this catalog and semester offerings are subject to change. Please go to the Registrar's webpage or the live semester course browser for up-to-date information including faculty teaching assignments. For more information about a specific course, talk to the course instructor listed in the current or previous registration booklets. Prerequisites and co-requisites may occasionally be waived with permission of the course instructor.

## Course Numbering Nomenclature

Course numbers are composed of an alphabetic prefix and a numeric suffix. The alphabetic prefix indicates the primary area of the course, according to the following table. Note that some courses earn credit for multiple areas (see Course Listings Table below).

Alphabetic Prefix	Primary Area
AHSE	AHS/Entrepreneurship
ENGR	Engineering
ENGX	Cross-disciplinary engineering content
MTH	Mathematics
SCI	Science

The first digit of the numeric suffix indicates the nominal level of a course according to the following table.

Numeric Suffix	Level
0XXX	Any
1XXX	Introductory
2XXX	Intermediate
3XXX	Advanced
4XXX	Summative/Capstone

## Hours/Week Nomenclature

The definition of a credit hour at Olin, is 1 credit is equal to 3 hrs of work per week. Olin's standard calendar is 15 weeks/semester.

To better allow teaching staff, facilities schedulers, and students to manage the time requirements of every course, the number of expected hours per week is indicated by a triplet of numbers, as follows: (Contact) – (Non-Contact) – (Preparation)

- Contact: The first number indicates approximately the number of hours per week teaching staff and students will spend together in scheduled school facilities.
- Non-Contact: The second number indicates approximately the number of hours students will spend each week working on their own in scheduled school facilities.
- Preparation: The third number indicates approximately the number of hours per week a well-prepared student with good study habits should expect to spend studying and completing homework, reading assignments, projects, etc.

For example, the AHSE1100 History of Technology: A Cultural and Contextual Approach course is described as a 4-0-8 course, so students in the course can expect to spend four hours in class with an instructor, and approximately eight hours outside of class completing course-related assignments.

At Olin, we expand this definition to include non-degree credit work in the form of Passionate Pursuits (p. 36). Passionate Pursuits may be a maximum of 1 credit and equal to 3 hours of student time/week during a semester.

## Activities Not Eligible for Credit

Areas of student engagement in activities that are not eligible for credit and inclusion on the transcript are clubs and organizations (including competition teams), community service, recreation. As part of the Learning Continuum, we encourage students to engage and celebrate their love of learning within these spaces to the extent possible as time allows.

## ADMN - Olin Administration

### OIP1000 Olin Internship Practicum I

Internships during the summer can be integral to a student's major. This course provides an opportunity for the student to develop career-related competencies and reflections based on their full or part-time summer internship experience. OIP1000 also focuses on the connections of an internship experience with major coursework, thus enhancing student learning in their academic major. OIP1000 class meetings include a departure meeting in the spring before the summer internship, check-ins during the summer, and follow-up workshops in the fall. OIP1000 is offered each fall semester.

Please Note: International students must have authorization from the Principal Designated School Official or Designated School Official (PSDO/DSO) before they start their internship.

Credits: 1 ADMN. Recommended Requisites PGP Workshops. Hours: 0-0-15.

### OIP1001 Olin Internship Practicum II

Internships during the school year can be integral to a student's major. This course provides an opportunity for the student to develop career-related competencies and reflections based on their part-time fall or spring semester internship experience. OIP1001 also focuses on the connections of an internship experience with major coursework, thus enhancing student learning in their academic major. OIP1001 is offered each fall and spring semester and must be taken concurrently with their part-time internship.

Please Note: International students must have authorization from the Principal Designated School Official or Designated School Official (PSDO/DSO) before they start their internship.

Credits: 1 ADMN. Recommended Requisites PGP Workshops. Hours: 0-0-15.

## AHSE - Arts, Humanities, Social Science, and Entrepreneurship

### AHSE0112 The Olin Conductorless Orchestra Audition

The Olin Conductorless Orchestra (OCO) The Audition Year - an ensemble, minus conductor - features instrumentalists in leadership and collaborative roles. Dedicated to orchestral performance in the concerted spirit of chamber music, the orchestra forges individual participation, active listening, and group-motivation into performances that have established it as the only conductorless orchestra of its kind at an American college.

Credits: 1 AHSE. Recommended Requisites Audition. Hours: 2-0-1.

### AHSE0114 Olin Conductorless Orchestra

The Olin Conductorless Orchestra (OCO) - an ensemble, minus conductor - features instrumentalists in leadership and collaborative roles. Dedicated to orchestral performance in the concerted spirit of chamber music, the orchestra forges individual participation, active listening, and group-motivation into performances that have established it as the only conductorless orchestra of its kind at an American college.

Credits: 2 AHSE. Hours: 4-0-2.

### **AHSE1100 History of Technology: A Cultural & Contextual Approach**

Throughout the semester we will investigate different history of technology narratives by employing a variety of analytical frameworks. Our narrative case studies range from bronze age societal studies to cutting edge AI and sustainability technologies, and throughout the semester we will compare and contrast these narratives in search of larger insights. We will identify and employ analytical frameworks such as large technological systems; paradigms and scientific revolutions; technologies and political values; ethical theories; and the environmental and sustainability implications of technologies. Throughout the semester we will engage these narratives and frameworks through targeted writing activities, debates, individual and group presentations, readings and videos, and in-class discussions. Students will have a high degree of autonomy, and will set and evaluate their own learning objectives, determine the topic for their final projects, and design and facilitate in-class activities throughout the semester.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1122 The Wired Ensemble -Instruments, Voices, Players**

Three concurrent streams comprise The Wired Ensemble: 1) composition and performance of original works for instruments and voices; 2) development of a "Composer's Tool Chest"; and 3) musical analysis and reflection. As composers and performers, students concentrate on instruments, voices, and the symbolic language that brings them to life. They compose music for every family of instruments (woodwinds, brass, strings, percussion), as well as voice and spoken word. The course features biweekly performances of original compositions. Students also have the opportunity to hear their works performed in concert settings by professional and peer musicians with whom they have collaborated. Seminar trips to Boston and New York enable the class to gather musical and inspirational material, in addition to hearing some of the finest orchestral and vocal ensembles in concert. While actively engaged in composition and performance-all geared to an end-of-term production-students examine the worlds of earlier composers in order to provide context for their own lives and work.

"

Credits: 4 AHSE. Recommended Requisites Ability to read music.. Hours: 4-0-8.

### **AHSE1135 The Digital Eye: Photography, Vision, and Visual Communication**

This course is all about developing a creative voice in the visual arts using digital photography as the medium of choice. The Digital Eye is a hands-on course taught in studio mode and it is project-based with weekly homework assignments that also includes several major projects allowing longer-term project engagement. Digital single-lens reflex (DSLR) cameras, digital editing tools and printing capabilities are provided and gaining technical facility with these tools is an important goal. As this is an AHS foundation course, students will also have an opportunity to further develop written communication skills and critical thinking ability. We will consider the many interpretations of art and the visual communication of ideas. The work of contemporary fine art photographers will be studied in depth and trips to museum and gallery exhibits will be scheduled as appropriate as will field trips with the class to capture images in interesting locations. Students with no prior experience with photography are strongly encouraged to enroll in this course and are as welcome as those who have already discovered a passion for creative expression using photography.

Credits: 4 AHSE. Hours: 4-0-8.

**AHSE1148 Dirt to Shirt: Global Garments in Context**

This course is an intensive study of the global supply chain for clothing. It examines social, economic, political, environmental, and technological issues all along the supply chain. This includes historical and contemporary production of components such as cotton, wool, and Kevlar; textile processing and garment production; and the after-life of the clothes we dispose of. The class will include readings, discussions, and engagement with multimedia sources; first-person contact with local people involved in the industry; and student projects on a chosen node of the supply chain. The course is multidisciplinary, but centered in cultural anthropology. In anthropology, empathy is a means to understanding, and a central premise of the course is the need to develop empathy. This class takes an empathetic approach to people and activities all along the global garments supply chain.

Credits: 4 AHSE.

**AHSE1155 Identity from the Mind & the Brain: Who Am I and How Do I Know**

Perhaps the most fundamental question any developing individual asks himself/herself is: Who am I? The ways we answer this question have evolved over the course of history as the dominant ways of knowing (epistemologies) have shifted. Indeed, the question of how we come to know ourselves has captivated Western scholars since the days of Descartes, but a look at the last fifty to sixty years has also seen enormous changes. Many people invoke psychological and philosophical perspectives in describing their identity, focusing on their personality, their developmental history, and their place in society. But the explosion of neurobiological research has introduced a new and viable outlook: explaining identity at the chemical and electrical level of the brain. There is good reason to think that these different perspectives on identity are mutually exclusive and this tension will underlie everything we discuss in this interdisciplinary course. Indeed, when it comes to a topic as fundamental to human existence as identity, it is absolutely essential to wonder not only "who am I?" but to also ask "how do I know?" In this course, we will approach the question of identity from multiple perspectives, including psychology, postmodern philosophy, and neuroscience. In the process, we will critically examine not only the conception of identity that each perspective supports, but also the assumptions and limitations of each epistemology. This course focuses more on the science of psychology and neuroscience, while AHSE 1150: What Is "I"? is more focused on philosophy and artificial intelligence.

Credits: 4 AHSE. Hours: 4-0-8.

**AHSE1160 Democracy and Media**

Everyday, you have the opportunity to choose democracy. When we think of democracy, we usually think of a form of government: a representational democracy like the United States. But, the experience of participating in a representational democracy is not always democratic. Conversely, companies and colleges like Olin are not organized as democracies, and yet the people that work and study there have many opportunities to practice democracy. Democracy is something you, and those around you, can choose to create and practice. To achieve this, we must acknowledge that democracy is contextual and mediated. Dimensions such as gender, race, class, ideology, norms, economics, and institutional power all affect the political standing of citizens and issues. Media, too, has long shaped the experience of democracy: debate, writing, voting, and petitioning are ancient technologies. The design and use of contemporary information and communication technology dramatically shape how democracy plays out. This course will ask you to confront this tangle of interests, identity, technology, and power. We will ask ourselves the quintessential civic question: "What should we do?" and consider "What is my role and responsibility as a citizen? as an engineer? as a member of the Olin community?" You will explore ways to make the spaces you live and work in more democratic. You will practice using your voice and influence to make change through public narrative, collective action, and media.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1170 Infrastructure Studies**

We live our lives embedded in systems that help take care of many of our basic needs, as well as some that are not so basic: warmth (or cooling), clean water, hygiene, and communications. At the same time, these systems provide the technological context for our engineering work. But we rarely notice infrastructure until something goes wrong. In this course, we'll investigate the systems that surround us, including water, sewage, electricity, telecommunications, transport, and more. We'll start thinking more broadly about infrastructure, asking questions like "what makes a system 'infrastructure', and why?". To do this, we'll draw from a wide range of fields and materials, from scholarly essays to videogames. And we'll consider our collective future: how might we make infrastructural systems more sustainable, resilient, and equitable? By the end of the semester, you will have a new awareness and understanding of these systems that underpin our lives and engineering work, and you will have the opportunity to document and share your own exploration of these systems.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1180 Inform Demystify Empower: Intro Science Communication**

We live in an era of immense scientific and technical knowledge; millions of scientific papers have been written and indexed by searchable catalogs. But these papers are written with jargon and higher-level math, making them incomprehensible to most. Non-experts rely on translators, or science communicators, to accurately convey the meaning of those papers. It is science communicators that allow everyday folks to make science-informed choices about the food they eat, the medical care they receive, and what products they buy. In this course, you will learn the principles of good science communication. You will critically analyze and discuss science communication media. You will practice communicating technical topics using various media, which may include written articles, podcasts, and interactive games.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1199 Arts, Humanities, Social Science Foundation Topic**

Special Topics in Arts, Humanities and Social Science classes (AHSE X199) typically cover a specific topic in Arts, Humanities and Social Science and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1515 Products and Markets**

In this foundational course on business and entrepreneurship, students engage with the concept of entrepreneurship as the pursuit of opportunity to create value for others. By working in teams to conceive and execute a series of entrepreneurial experiments, students in this course develop the skills necessary to design and test value propositions, assess and improve product-market fit, and create sustainable business models. The course places special emphasis on entrepreneurship as a way of doing good in the world, and invites students to approach all aspects of engineering with an entrepreneurial mindset. In addition, students are exposed to personal and interpersonal tools that enable high-performance teamwork, including project planning and peer feedback. These entrepreneurial experiences and their associated challenges provide a context in which students can develop broader self-awareness, productive self-reflection, and courage.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE1599 Entrepreneurship Foundation Topic**

Special Topics in Entrepreneurship classes (AHSE X599) typically cover a specific topic in Entrepreneurship and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE2100 Engineering in Context**

Engineering, science, technology, and math are fundamentally human endeavors, socially constructed and society-shaping. This dialogue between humans, our natural environment, and the technical world that we have created are complex and fascinating.

Each student will select a technical course that you are concurrently taking, and you will use that course to explore its larger STEM discipline through lenses such as its ethical, environmental, and societal (historical, political, economic!) contexts and implications. We will engage in common readings and projects intended to build a critical thinking toolkit for historical and contextual study, and students will also explore their chosen technical field individually or in small groups. This course represents a novel approach towards interdisciplinary integration: you get to choose the course we'll connect with, and all of us will deepen the connection. And as a relatively new offering still open to modifications, we have many opportunities to work together to improve this learning experience throughout the semester. Join the fun and let's build something exciting!

Credits: 4 AHSE. Recommended Requisites AHS foundation course. Hours: 4-0-8.

### **AHSE2112 Six Books that Changed the World**

Why and how do certain books reshape the course of human history? In this course, we will explore six books, selected from different times, societies, and genres, that have had an unquestionably major impacts upon the world in which we live. Class meetings will integrate contextual studies of the historical context of each book (including the author's background, the political and social setting, and other factors), careful analyses of the works themselves, and discussions of why they proved so influential. Our discussions will investigate each book's contemporary and modern impact while also exploring the qualities that caused all of our selections to have such an enduring and global effect. Students will be expected to contribute to class discussions, make presentations, and write a report on an additional book of their choosing. NOTE: this course lasts one half of the semester, will meet twice a week, and will require approximately 12 hours of student effort each week.

Credits: 2 AHSE. Recommended Requisites AHS Foundation. Hours: 4-0-8.

### **AHSE2114 Science Fiction and Historical Context**

Science fiction is a wonderful genre that somehow captures a society's ideals, fears, assumptions, and major challenges. In the same way that a historian attempts to piece together complex cause-effect chains to make sense of the past, science fiction writers project the values, technologies, and beliefs of their own societies into alternate or future realities. Our class will work together to understand the conventions of science fiction and explore science fiction works (books, short stories, film) produced in different times, across various cultures, and in different sub-genres of this field.

Students will have the opportunity to analyze different works of science fiction through writings and class discussions, and can also choose to develop a science fiction idea of their own. NOTE: this course lasts one half of the semester, will meet twice a week, and will require approximately 12 hours of student effort each week.

Credits: 4 AHSE. Recommended Requisites AHS Foundation. Hours: 4-0-8.

### **AHSE2116 Framing History through Comics: Icons, Identities, and Impacts**

Comic books and graphic novels unlock the epic potential of narrative storytelling. In Framing History we will explore how comics make history (what would you choose as the most impactful comics and graphic novels of all time?) as well as how they portray history. We will study a selection of classic graphic novels in different genres such as biography, autobiography, history, superhero, activism, children's fiction, and others. As we analyze the dynamic space where prose meets art, we will also learn how comics reflect their historical context while impacting so many aspects of our society in return. This course will rely heavily upon student input and feedback, and will use the co-design model to invite students to help test new assignments and design important elements of the class. Our journey will feature plot twists and cliffhangers and promises to be a true page-turner!

Credits: 2 AHSE. Hours: 4-0-8.

### **AHSE2131 Responsive Drawing and Visual Thinking**

Drawing and Visual Thinking is a semester length course that meets twice per week during a standard 100 minute block and assumes no prior experience in drawing. Students will learn to visualize objects in three-dimensional space and commit them to the two-dimensional space of a sheet of paper. Students will draw subjects from life, i.e. stationary objects and life models using media including charcoal, graphite, conte, and ink. The emphasis will be realistic depiction as compared to non-objective abstraction. Students will begin with basic exercises in drawing and rapidly move to more complex intensive drawing experiences. Approximately one-third of the classroom time will be used for drawing from a life model. Class discussion and sketchbook homework assignments will be an essential element in the learning process. Homework assignments will include drawing and visual thinking exercises to be completed in personal sketchbooks. Reading selected text material is also part of the homework requirement. Invited speakers will contribute to the course and provide informal critiques of student work. At least one field trip is planned to a local art museum. Other in-class activities will include participation in discussion of drawings (old master, 19th century and contemporary) group critique sessions, and viewing documentary material. Assessment will be measured by improvement based on weekly homework assignments, classroom work, and three drawing projects to be completed outside of class. This can be fun, and you will surprise yourself with how well you can draw realistically by the end of the course.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE2135 Digital Photography: Seeing is Believing**

This course is all about the communication of ideas and developing an independent creative voice in the visual arts using digital photography as the medium of choice. Fine art photography and documentary photography are the twin focus areas with individual expression fostered and doing good in the world using photography will be prioritized. Digital Photography: Seeing is Believing, will be a hands-on course taught in studio mode and will be project-based with weekly homework assignments that also includes several major projects allowing longer-term project engagement. Digital single-lens reflex (DSLR) cameras, digital editing tools and printing capabilities are provided and gaining technical facility with these tools is an important goal. We will consider the many interpretations of fine art photography from traditional landscape work to conceptual art. A second equally important focus is how photography can be used to do good in the world, in particular, to call attention to climate change and what to do about it. The work of contemporary fine art photographers and documentary photographers will be studied in depth and trips to museum and gallery exhibits will be scheduled as appropriate as will field trips with the class to capture images in interesting locations. Students with no prior experience with photography are strongly encouraged to enroll in this course and are as welcome as those who have already discovered a passion for creative expression using photography.

Credits: 4 AHSE. Recommended Requisites no prior experience is required (or expected). Hours: 4-0-8.

### **AHSE2141 Engineering for Humanity**

This course introduces students to engineering problem solving, beginning with understanding client needs and ending with implemented, adaptable, adoptable, and sustainable solutions. This course will draw equally on empathetic and ethnographic methods and on a technical understanding of the problem and solution domains. Over the semester, we will learn about and with our clients; we will identify specific challenges that our clients face; and together with our clients we will develop concrete solutions to address these challenges. Students will leave Engineering for Humanity with a grounded understanding of the engineering problem solving process, experience in participant-observer fieldwork, and hopefully a feeling of satisfaction at having made a concrete difference in the lives of members of our community.

The projects will be specific service projects that students identify and design while working with senior citizens in surrounding communities. For example, students might design a device to help someone who has difficulty reaching up to change a light bulb, something to help hold a newspaper steady with shaky hands, or something to enable someone to get clothes out of a clothing dryer that is difficult to stoop down to reach. Some sessions of the course will be devoted to co-design with the client population or to team meetings. Other sessions involving guest speakers and fieldtrips, others with course discussion of topics relevant to aging. Students must simultaneously enroll in AHSE2141 and ENGR2141 for a total of 4 credit hours.

Credits: 2 AHSE. Concurrent Requisites: ENGR2141. Hours: 6-0-6.

### **AHSE2150 Six Microbes that Changed the World with Laboratory**

Penicillium. Vibrio cholerae. Escherichia coli. Yeast. The Archaea. Microbes surround us, and impact our lives, our health, our societies, and our environment. Research with microbes, the smallest of all living creatures, has enabled discovery and understanding of the fundamental workings of life, opens up rich historical narratives of diseases and cures, and may provide sustainable solutions to problems we face from bioremediation to bioenergy. We will use six influential microbes as a window into a rich study of the interactions between science and societal context. This course connects biological concepts and historical knowledge through discussions, integrated assignments, presentations, and hands-on laboratory activities. Let's explore the thrill of biology and history, together.

Credits: 4 AHSE. Concurrent Requisites: SCI1250.

### **AHSE2155 Constructing and Performing the Self**

In this course, theatrical and psychological approaches will be purposely inter-mingled: the questions we will ask and the answers we will derive will be informed equally by each. You will see, on a daily basis, how each field informs, supports, and speaks to the other as you oscillate between the roles of scholar, writer, actor, and critic. While we will have some class sessions and assignments explicitly grounded in only one field to build your fluency speaking their languages, the major activities of the semester will require both. The final deliverable for the course will be a short, personal monologue, informed by the scientific literature on identity, which you will write and then perform as part of a fully-mounted theatrical production in the Studio Theater at Babson. No playwriting or acting experience is necessary.

Registration note: This course brings together the psychological study of identity and the theater of solo performance to ask one of the most fundamental of all questions: who am I? The instructors received the inaugural BOW Curriculum Innovation Fellowship to develop the course, which will include students from all three colleges.

Credits: 4 AHSE.

### **AHSE2160 The Intersection of Biology, Art and Technology (IBAT)**

This project-based course will encourage participants to cross boundaries between art, biology and technology with hands-on projects inspired by contemporary and historical work in these fields. How might biology inform art practice and how might art inform biology? What role does technology play in advancing or restricting each field and how might art and biology inspire technological breakthroughs? What are the implications of being able to change the genome of an organism? What is art anyway? These are just some of the questions we will pursue during this course. We will begin the course with an investigation of the phenomena of climate change and consider what steps we might take individually and collectively to contribute to the sustainability of the planet. Visualization technologies such as the scanning electron microscope (SEM) will be utilized to observe and create artworks. Final student-designed projects are informed by biology, art and technology and encourage deep exploration and integration of these topics. Laboratory studies will enhance an understanding of biology and its relation to technology as well as providing a possible means to create art. We will delve into a variety of written works, films and video resources, and listen first-hand to practitioners in these areas about the challenges and rewards of interdisciplinary work in fields that most would regard as unrelated. The goal by the end of the course is to acquire an attitude that allows fluid movement from one field to the other in thinking and doing so as to garner creative strength not possible from study of each field alone.

Credits: 4 AHSE. Concurrent Requisites: SCII260.

### **AHSE2170 Teaching and Learning in Undergraduate Science and Engineering**

This course will examine select topics in teaching and learning in undergraduate science, technology, engineering, and mathematics (STEM) courses. The goal of the course is to help participants become effective tutors, teaching assistants, mentors, and future instructors in these fields through a deep examination of teaching and learning in STEM courses. In a seminar format, participants will discuss research on best practices in pedagogy and curriculum design, cognition and learning, student classroom experiences, diversity, and assessment. Students will gain experience in instructional design, pedagogy, and assessment, and will develop a teaching portfolio. (Note: While the course readings are largely on research in science and engineering education, the course will touch on issues in mathematics education, and many course concepts can be extended to mathematics and technology instruction. As well, the theoretical and practical portion of the class may be extended to the K-12 domain.)

Credits: 4 AHSE. Recommended Requisites must have successfully completed the AHS foundation requirement. Hours: 3-0-9.

### **AHSE2180 Narrative Psychology**

Humans are natural storytellers. Indeed, it has been suggested that the natural mode of human thought takes a narrative form. This course will present an examination of the scientific study of humans' approach to meaningmaking through the crafting and telling of personal stories. The course will include consideration of the ways in which we create meaning out of our experiences with a special emphasis on identity development, drawing on scientific research from personality, developmental, and clinical psychology.

Credits: 4 AHSE. Hours: 4-0-8.

### **AHSE2199 Special Topics in Arts, Humanities and Social Science**

Special Topics in Arts, Humanities and Social Science classes (AHSE X199) typically cover a specific topic in Arts, Humanities and Social Science and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits AHSE.

**AHSE2515 Iterate**

This course is about exploring the potential of ideas and their ability to create value in the wild. If you have the seed of an idea, an inkling, or even are just curious, this class offers an explicit structure for you to test and validate your ideas. Each offering of the course will consist of three two-week sprints. During each, you will be compelled to test a different question, hypothesis or assumption about your idea by getting in front of real people. Outside resources, mentors and advisors will be substantively engaged based upon the specific needs of each project.

Students may enter as either individuals or teams. You don't have to have a pre-existing idea or business before the course. This is a 2-credit course and may be taken multiple times for full credit. Four credits of this course may also be used to satisfy the project requirement as part of an entrepreneurship concentration.

Credits: 4 AHSE. Hours: 4-0-8. Prerequisite: AHSE1515.

**AHSE2515A Iterate**

This course is about exploring the potential of ideas and their ability to create value in the wild. If you have the seed of an idea, an inkling, or even are just curious, this class offers an explicit structure for you to test and validate your ideas. Each offering of the course will consist of three two-week sprints. During each, you will be compelled to test a different question, hypothesis or assumption about your idea by getting in front of real people. Outside resources, mentors and advisors will be substantively engaged based upon the specific needs of each project.

Students may enter as either individuals or teams. You don't have to have a pre-existing idea or business before the course. This is a 2-credit course and may be taken multiple times for full credit. Four credits of this course may also be used to satisfy the project requirement as part of an entrepreneurship concentration.

Credits: 2 AHSE. Hours: 4-0-8. Prerequisite: AHSE1515.

**AHSE2599 Special Topics in Business and Entrepreneurship**

Special Topics in Entrepreneurship classes (AHSEX599\*) typically cover a specific topic in Entrepreneurship and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits AHSE. Prerequisite: AHSE1515.

**AHSE3130 Advanced Digital Photography**

In this project-based course, students will develop a personal photographic point of view matched with consistently well-crafted imagery informed by the work of leading contemporary photographers. While communication with visual images is paramount, technical issues will be addressed in some depth. For example, there will be instruction and practice with image capture and editing including High Dynamic Range (HDR) exposure and processing, color management methods and printing, Adobe Lightroom/Photoshop tools and techniques, graphic design and book production methods. Initial projects will stimulate creative thinking and group critiques will help monitor progress and inspire new directions. The culminating project will be the design and production of a photography-based book by each member of the class. A critical awareness of the medium of fine art photography will be fostered through selected readings, discussions, and visits to galleries and museums.

Credits: 4 AHSE. Hours: 4-0-8.

**AHSE3190 Arts Humanities Social Sciences Capstone Preparatory Workshop**

This course offers the opportunity to begin researching your proposed AHS Capstone project topic, plan logistics, and write a proposal prior to enrolling in the AHS Capstone project. Students will work on a series of tasks throughout this semester in an independent manner, and can solicit feedback from other students in this course, Capstone teaching assistants, and Capstone teaching staff. Tasks include identification of the project area/topic and mentor, production of a partial annotated bibliography (that contextualizes each source with respect to one or more scholarly disciplines), and a detailed Capstone proposal (which includes a project statement, thesis, plan of work, etc.).

Credits: 1 AHSE. Hours: 0-0-3.

### **AHSE3199 Special Topics in Arts, Humanities and Social Sciences**

Special Topics in Arts, Humanities and Social Science classes (AHSE X199) typically cover a specific topic in Arts, Humanities and Social Science and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits AHSE.

### **AHSE3599 Special Topics in Business and Entrepreneurship**

Special Topics in Entrepreneurship classes (AHSE X599) typically cover a specific topic in Entrepreneurship and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits AHSE.

### **AHSE4190 Arts Humanities Social Sciences Capstone Project**

The AHS Capstone is an advanced, self-designed AHS project that builds upon a student's prior experience in one or more AHS disciplines. Students concentrating in the Arts, Humanities and Social Sciences must complete either a 12 credit concentration or an 8 credit concentration with an AHS Capstone in order to graduate. AHS Capstone students will complete a proposal, a journal, a disciplinary deliverable, an analysis of their deliverable, and a presentation. Class sessions will vary between meetings of the entire class, small group workshops, and individual meetings. Olin requires that students complete the AHS Capstone Preparatory Seminar prior to taking the AHS Capstone course.

Credits: 4 AHSE. Hours: 4-0-8. Prerequisite: AHSE3190.

### **AHSE4199 Special Topics in Arts, Humanities and Social Sciences**

Special Topics in Arts, Humanities and Social Science classes (AHSE X199) typically cover a specific topic in Arts, Humanities and Social Science and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits AHSE.

## **ENGR - Engineering**

### **ENGR1125 Introduction to Sensors, Instrumentation and Measurement**

Conducting experiments and making measurements is an essential aspect of all branches of science and engineering. Nearly all of our current quantitative understanding of the natural and engineered world has come from the interplay between theory and measurements. Models and simulations of systems require experimental validation and performance of engineered systems must not only be predicted, but also measured and tested. In this course we will learn the basic tools of making physical measurements and conducting experiments. We will collect data, analyze data, conduct basic error analysis, and design experimental systems. Using inexpensive modern sensors, we will build the necessary supporting electronics and learn to collect data with computer based data acquisition systems. The first part of the course will focus on individual work and students will conduct labs on basic electrical, mechanical and environmental measurements. The later part of the course will involve a team project that involves designing and executing an experiment that involves measurement, data acquisition and data analysis.

Credits: 4 ENGR.

### **ENGR1199 Special Topics in Engineering**

Special Topics in Engineering classes (ENGR X199) typically cover a specific topic in Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

**ENGR1200 Design Nature**

We take nature, an important source of inspiration and understanding, as a theme and develop bio-inspired ideas into functional prototypes. Our focus is on the general principles and methods that shape the practice of engineering design. Students gain experience in sketch modeling, experimentation, estimation, fabrication, teaming, and presentation as they relate to designing through individual and team projects. We seek to develop a shared practice and understanding of engineering design while supporting students as they develop their engineering design identities. Throughout, we engage with sustainability by incorporating principles of biomimicry and taking environmental impact into account.

Credits: 4 ENGR. Hours: 6-0-6.

**ENGR1330 Fundamentals of Machine Shop Operations**

This course covers the fundamentals of machine tool operations, classical machining techniques, and CAD methods. Students will learn principles of technical drawing, fabrication and assembly of mechanical systems, how to interpret and establish appropriate design requirements to make parts to specification and how to inspect parts to ensure that they meet specification. Students will come away with a sound understanding of drawing interpretation and creation, machine shop safety, bench work, measurement, part layout, and machine setup, operation and maintenance.

Assigned projects will involve significant machining time to fabricate mechanical components and a working mechanical system (e.g., tesla turbine).

Credits: 4 ENGR. Hours: 4-4-4. Prerequisite: ENGR1200.

**ENGR2110 Principles of Integrated Engineering**

Through a significant project experience, students will learn to integrate analysis, qualitative design, quantitative optimization, experiments, and simulations to improve their ability to engineer real systems. In each section of the course, students will work in small multidisciplinary teams to design and to build a mechatronic system of their own choosing. Each project must include both a nontrivial mechanical system design and a nontrivial electronic system design involving both hardware and software components. Projects will be subject to realistic materials, process, and budgetary constraints.

Credits: 4 ENGR. Hours: 4-4-4. Prerequisite: ENGR1125.

**ENGR2141 Engineering for Humanity**

This course introduces students to engineering problem solving, beginning with understanding client needs and ending with implemented, adaptable, adoptable, and sustainable solutions. This course will draw equally on empathetic and ethnographic methods and on a technical understanding of the problem and solution domains. Over the semester, we will learn about and with our clients; we will identify specific challenges that our clients face; and together with our clients we will develop concrete solutions to address these challenges. Students will leave Engineering for Humanity with a grounded understanding of the engineering problem solving process, experience in participant-observer fieldwork, and hopefully a feeling of satisfaction at having made a concrete difference in the lives of members of our community.

The projects will be specific service projects that students identify and design while working with senior citizens in surrounding communities. For example, students might design a device to help someone who has difficulty reaching up to change a light bulb, something to help hold a newspaper steady with shaky hands, or something to enable someone to get clothes out of a clothing dryer that is difficult to stoop down to reach. Some sessions of the course will be devoted to co-design with the client population or to team meetings. Other sessions involving guest speakers and fieldtrips, others with course discussion of topics relevant to aging. Students must simultaneously enroll in AHSE2141 and ENGR2141 for a total of 4 credit hours.

Credits: 2 ENGR. Concurrent Requisites: AHSE2141. Hours: 4-4-4.

### **ENGR2160 DREAM Designing Resources for Empowerment**

DREAM is a studio for students to examine inequalities in places where hands-on making is encouraged and to understand what it means to develop empowering experiences. The class features hands-on projects that allow students to expand their skills as makers with media of their choosing, from computing to craft material and from CAD to CAM. Students will attend at least one of approximately four interactions with off-campus entities such as community technology centers, maker faires, and innovation spaces in schools or libraries. A group project will provide opportunities for students to grapple with the realities of facilitating hands-on making in scenarios where participants have a history of being marginalized. Weekly class meetings mix making time with studying cases of both effective and ineffective empowering interventions in a variety of settings. Students will draw from lessons learned from each case as they design their experiences pragmatically.

Credits: 4 ENGR. Hours: 4-4-4.

### **ENGR2199 Special Topics in Engineering**

Special Topics in Engineering classes (ENGR X199) typically cover a specific topic in Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

### **ENGR2250 Collaborative Design**

Students develop detailed concepts and models of authentic new products and services. Our focus is on user-oriented, collaborative approaches to design and seeking holistic solutions integrating user and functional perspectives. We emphasize the importance of process and the development of strategies. Students observe and engage people to develop a deep understanding of their values and the patterns of their lives. They work collaboratively in a studio environment to create a shared understanding of the people they design for (and with) and the product ideas they develop. Topics covered include design thinking, ethnographic methods, concept development and interaction design.

Credits: 4 ENGR. Hours: 4-4-4.

### **ENGR2299 Special Topics in Design Engineering**

Special Topics in Design Engineering classes (ENGR X299) typically cover a specific topic in Design Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Hours: 4-4-4.

### **ENGR2320 Mechanics of Solids & Structures**

This course covers the principles of statics of structures and mechanics of materials. The focus is on the concepts of stress and strain as related to applied loads (axial, shear, torsion, bending) and to resulting deformation. Students will learn how the principles of mechanics can be applied to mechanical design through modeling, quantitative analysis, strain gauge measurements, and computational simulation. The use of a commercial finite element package is introduced.

Credits: 4 ENGR. Hours: 4-4-4.

### **ENGR2330 Introduction to Mechanical Prototyping**

Through project experiences, students will learn the techniques needed to both master the technical communication of mechanical designs and the fabrication skills needed to rapidly build them. Students will practice professional drafting techniques to describe a full range of fabricated components, including milled, lathed, sheet metal, water jet, injection molded, 3D printed and welded components. This course will include a significant machine shop component, where each student will gain exposure to advanced fabrication techniques. The final project will be the design and fabrication of a fully operational, complex mechanical system.

Credits: 4 ENGR. Hours: 4-4-4. Prerequisite: ENGR1200.

**ENGR2340 Engineering Systems Analysis: Dynamics**

This course is an extension of Engineering Systems Analysis. This second half course extends material from the first half-semester to focus on the derivation, analysis, and simulation of translational and rotational equations of motion for particles and rigid bodies in 3D using physics-based models.

Along with ENGX2134, this course is required for ME majors.

Credits: 2 ENGR. Recommended Requisites completion of QEA 1, 2, and 3. Hours: 4-0-8. Prerequisite: MTH1111.

**ENGR2360 Introduction to Thermal-Fluid Systems**

This course covers the fundamental principles of thermodynamics, heat transfer, and fluid flow as applied to engineering systems. It provides a foundation in fundamental thermodynamic phenomena, including the first and second laws of thermodynamics for closed systems, thermodynamic properties, and equations of state in ideal gases and incompressible fluids. Topics in heat transfer include conduction, convection, and resistance networks, with an emphasis on thermal modeling. Topics in fluid flow include pipe flow networks, inviscid flows, and basic aerodynamics. Students will predict the behavior of engineered systems, design kites that fly, and develop curiosity about thermal-fluid phenomena in everyday life.

Credits: 4 ENGR. Hours: 4-0-8. Corequisite: ENGX2010; OR ENGX2011.

**ENGR2399 Special Topics in Mechanical Engineering**

Special Topics in Mechanical Engineering classes (ENGR X399) typically cover a specific topic in Mechanical Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

**ENGR2410 Engineering Systems Analysis: Signals**

As a half-course, Engineering Systems Analysis: Signals extends material from the first half-semester to focus on fundamental concepts from linear systems such as frequency response, impulse response, and system identification. The course introduces sampling and aliasing, as well as discrete-time linear operators, transforms, and filtering.

Along with ENGX2134, this course is required for ECE majors.

Credits: 2 ENGR. Hours: 4-0-8.

**ENGR2420 Intro Microelectronic Circuits with laboratory**

This course will cover elements of linear circuits, such as the operation of basic circuit elements, fundamental circuit laws, and analytic techniques in both the time domain and the frequency domain. It will also cover the transistor-level design of complementary metal-oxide-semiconductor (CMOS) electronic circuits in the context of modern integrated-circuit technology. The course will include an introduction to the fabrication and operation of metal-oxide-semiconductor (MOS) transistors and to the design and operation of the basic building blocks of analog integrated circuits including single-transistor amplifier stages, current mirrors, CAS codes, differential pairs, and single-stage operational amplifiers. Throughout the course, an emphasis will be placed on design-oriented circuit analysis techniques and developing circuit reasoning skills.

Credits: 4 ENGR. Recommended Requisites MTH2210. Hours: 4-4-4. Prerequisite: ENGR1125.

### **ENGR2510 Software Design**

Software Design (SoftDes) is an introductory course in computing that teaches students how to design, write, and maintain software in the Python programming language. SoftDes is not a programming course, but rather a course that explores and teaches the process of software engineering. This includes describing problems and their solutions in a logically precise way, writing well-styled code that clearly communicates the intent behind the code, and analyzing the design, usability, and performance of software.

Thus while much of the day-to-day work of SoftDes involves programming, the course concepts cover a far broader range of ideas. In addition to learning standard constructs in Python, including basic syntax, data types, common libraries and modules, classes, and object-oriented design, students will also learn how to debug faulty code, write unit tests to assess code correctness, how to break down large problem or systems into smaller, simpler components, how to obtain and handle data ethically, and how to maintain and collaborate on code using version control.

Credits: 4 ENGR. Hours: 4-0-8.

### **ENGR2599 Special Topics in Computing**

Special Topics in Computing classes (ENGR X599) typically cover a specific topic in Computing and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

### **ENGR2600 Topics in Bioengineering**

Broadly, Bioengineering can be defined as the application of engineering concepts and methods to the solution and study of biological and medical problems. Using a case study approach, this course aims to provide students with a broad understanding of the types of problems Bioengineers explore as well as the engineering and biological methods they employ. We will approach topics through seminar-style discussion of current primary articles from the literature as well as selected hands-on laboratory explorations of topics. Topics to be covered include tissue engineering, use of microfluidics devices for diagnostics, imaging disease states, and prosthetic limbs. In order to explore a topic of particular interest in more depth, students will also write and orally present a research paper on a topic of their choice.

This course is crosslisted with SCI2260. Taken under the ENGR2600 number, the course earns Engineering credit. To satisfy an advanced Biology requirement, enroll using SCI2260.

Credits: 4 ENGR. Recommended Requisites AP/IB Biology satisfies prerequisite if Olin Foundational Biology has not been taken.. Hours: 3-1-8.

### **ENGR2699 Special Topics in Bioengineering**

Special Topics in Bioengineering classes (ENGR X699) typically cover a specific topic in Bioengineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

### **ENGR2810 Environmental Analysis & Science**

How do we measure what's happening in our environment, what do we do with that information, and why do we care? This hands-on, project-based course will introduce approaches that environmental engineers and scientists use to analyze complex environmental systems in order to effectively design solutions to mitigate pollution. We will spend the semester making deep-dives into air quality and water quality, which are at the heart of the two leading causes of premature death in the world: chronic exposure to air pollution and lack of access to clean water. The class focuses on building hands-on skills with real-world data analysis, field sampling techniques and lab analysis skills through integrated projects like analyzing pollutant concentrations along the Charles River, and the course will incorporate strong communication themes as we work toward presenting our results to several diverse audiences. Throughout the course, we will study pollution in its broader social, political, and economic context, considering the complex motivations for pollution mitigation and the broader implications of water and air treatment processes.

This course is cross-listed with SCI2310.

Credits: 4 ENGR.

### **ENGX2000 Quantitative Engineering Analysis 1**

Quantitative Engineering Analysis 1 is the first in a series of interdisciplinary math, science and engineering courses.

The application of quantitative analysis of mathematical models and/or data can enable, improve, and speed up the engineering design process. Using quantitative analysis to answer engineering questions, you will be able to make the choices necessary to successfully complete an engineering design. Whether you are selecting the best part from a catalog, choosing an appropriate material, sizing a component, determining the effect of certain influences on your design, or optimizing your design within a parameter space, you often need to obtain (through experiment or calculation) and interpret quantitative information to inform your decisions. There are many different approaches to getting and interpreting the data you need: you may conduct an experiment, do a rough estimation, perform a detailed calculation based on mathematical models, or create a computer simulation. If you want to engineer effectively, you must be able to choose and use appropriate quantitative tools for a given situation.

In this class, you will be introduced to various approaches to perform quantitative engineering analysis through real-world examples. You will learn how to select between different tools and different approaches within the context of an engineering challenge, how to use many different tools for quantitative analysis, and how to acquire new tools on your own in the future.

This course fulfills the linear algebra requirement.

Credit distribution of this course is 2 MTH, 1 SCI, 1 ENGR.

Credits: 2 MTH, 1 SCI, 1 ENGR. Hours: 4-0-8.

### **ENGX2006 Quantitative Engineering Analysis 2**

Quantitative Engineering Analysis 2 is the 2nd course in a 3 course interdisciplinary sequence. The application of quantitative analysis of mathematical models and/or data can enable, improve, and speed up the engineering design process. Using quantitative analysis to answer engineering questions, you will be able to make the choices necessary to successfully complete an engineering design. Whether you are selecting the best part from a catalog, choosing an appropriate material, sizing a component, determining the effect of certain influences on your design, or optimizing your design within a parameter space, you often need to obtain (through experiment or calculation) and interpret quantitative information to inform your decisions. There are many different approaches to getting and interpreting the data you need: you may conduct an experiment, do a rough estimation, perform a detailed calculation based on mathematical models, or create a computer simulation. If you want to engineer effectively, you must be able to choose and use appropriate quantitative tools for a given situation.

In this class, you will be introduced to various approaches to perform quantitative engineering analysis through real-world examples. You will learn how to select between different tools and different approaches within the context of an engineering challenge, how to use many different tools for quantitative analysis, and how to acquire new tools on your own in the future.

This course fulfills the multivariable calculus requirement. Credit distribution of this course is 2 MTH, 1 SCI, 1 ENGR.

Credits: 2 MTH, 1 SCI, 1 ENGR. Hours: 4-0-8. Prerequisite: ENGX2000.

### **ENGX2011 Quantitative Engineering Analysis 3**

Quantitative Engineering Analysis 3 is the third course in the 12-credit QEA sequence required for some degree programs. The course will revisit, reinforce, and build upon the contextualized math, science, and engineering tools and skills developed during QEA 1 and 2. Conceptual material in QEA 3 will draw from topics including ordinary differential equations, Fourier transforms, and equations of motion. QEA 3 will endeavor to place this foundational material in the broader engineering context, drawing connections to relevant examples and applications in engineering and beyond. The course will teach students how to select the appropriate set of tools and techniques for a given situation, ask critical questions about the consequences of their work, and develop the skills needed to acquire new knowledge beyond the course material.

This course fulfills the ordinary differential equations requirement, and when coupled with Quantitative Engineering Analysis 2. Credit distribution of this course is 2 MTH, 2 SCI.

Credits: 2 MTH, 2 SCI. Hours: 4-0-8. Prerequisite: ENGX2006; OR SCI1199.

### **ENGX2134 Engineering Systems Analysis**

Engineering Systems Analysis involves building, developing, and practicing process-based quantitative analysis skills in the broad area spanning linear analysis of engineering systems. Concepts such as linearization, equilibrium, and stability will be applied to study dynamic response of electrical and mechanical systems in both the time and frequency domains through time-integration, transfer function, and state-space analysis. Ideas from feedback control are introduced. Coursework and projects will involve examples from robotics, communication systems, or aircraft/spacecraft.

This course is required for ME and ECE majors.

Credits: 2 ENGR. Hours: 4-0-8.

### **ENGX2199 Special Topics: Interdisciplinary Engineering**

Interdisciplinary Special Topics course in the quantitative engineering analysis content area.

Credits: 4 ENGR.

**ENGR3180 Renewable Energy**

Exploration of the science and dynamics of renewable energy technologies and their implementation, including grid and storage technologies. A systems-level exploration of renewable energy technology on human populations, economic, social and political power structures will be included as an integral part of this class. Course includes a renewable energy project design and simulation. Topics are: systems dynamics, thermodynamics, grid energy systems, solar photovoltaic, solar thermal, geothermal, hydroelectric and wind systems. Skills developed include the design and simulation of the energy performance of a renewable energy system using the National Renewable Energy Laboratory simulator.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGX2000 AND MTH1111.

**ENGR3199 Special Topics in Engineering**

Special Topics in Engineering classes (ENGR X199) typically cover a specific topic in Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

**ENGR3210 Sustainable Design**

This course provides a comprehensive introduction to sustainable design. We start with ecological system design addressing environmental impact through a team project on product-service system design. Here we are focused on life cycle analysis, dematerialization, circularity, and other ecodesign strategies. We continue with social system design addressing human and environmental well-being and justice through an individual project on generative organizational design. Here we are focused on value flow analysis, generative principles, solidarity economy, and other organizational design strategies. Students acquire an extensive set of skills involving sustainable design principles, tools, and techniques that can be applied in the real world and often lead to sustainability jobs for alums.

Credits: 4 ENGR. Hours: 4-0-8. Corequisite: ENGR2250.

**ENGR3220 Human-Computer Interaction**

Introduces fundamental methods and principles for designing, implementing, and evaluating digital interfaces. Considers the realities of human perception and behavior, the needs of people, and the pragmatics of computational infrastructure and application. Focuses on understanding and applying the lessons of human interaction to the design of usable computer-based applications. Learn by doing: work with a team on a semester-long design project. This course will mix studio (open project working time) and seminar (readings and discussion) formats.

Credits: 4 ENGR. Recommended Requisites ENGR 2510 or other software development experience recommended. Hours: 4-4-4. Prerequisite: ENGR2250.

### **ENGR3232 Biomedical Device Design**

Medical devices can be anything from a tongue depressor to a pacemaker with a microchip to a room-sized MRI, and everything in between. In this course, we will briefly consider the range of artifacts that are considered (bio)medical devices, how they are used, and who they are used for. We will primarily focus on the unique design constraints of and methods used in developing medical devices. We will touch on topics such as regulation and approval of devices, writing user requirements, writing product requirements, manufacturing practices, bioethics, and the body's response to implanted materials and surgical interventions. The first half of the semester will be spent developing skills through a case study model. In the second half of the semester, students will complete a major design project, with an external partner, that is focused at a particular stage of product development.

This course is open to students of all majors, satisfies a design depth requirement, and can be used as a mechanical engineering elective. While the examples used are from the biomedical industry, the skills developed are relevant to other highly regulated fields as well (e.g. aerospace).

Credits: 4 ENGR. Recommended Requisites Foundational Biology. Corequisite: ENGR2250.

### **ENGR3235 Biomimicry**

We can learn from nature! From studying a leaf to make a better solar cell to emulating natural processes to develop living buildings, the discipline of Biomimicry views nature as "a model, mentor and measure" (Benyus, 1997). Spiders spin protein silk with the strength of steel yet much lighter all at ambient temperature and pressure. Cuttlefish change color to match their surroundings in milliseconds by contracting their chromatophores and even bioluminesce. In this course we will study wonders like these to appreciate the beauty and sophistication of life by investigating the biological mechanisms and functions of organisms as well as the dynamics of whole ecosystems. By examining biological systems at multiple scales, we can draw insights from understanding how they work. By collecting data, running experiments, creating models, or building prototypes, we can translate these insights into design ideas and practice. We will examine and discuss big ideas and thinking in biology and design and then synthesize and reflect on the intersection of these fields. Students will develop skills and insights through critical analysis of readings and the development of projects that draw on both fields. Biological systems have undergone 3.8 billion years of evolution, resulting in time-tested approaches to living on earth that are efficient and embody sustainability. By exploring the intersection of biology and design, we might learn to do the same.

This course is crosslisted with SCI2235. Enrollment in ENGR3235 is as design depth as projects will be focused on engineering design solutions. If advanced science credit is desired, enroll in SCI2235.

Credits: 4 ENGR. Hours: 4-0-8. Corequisite: ENGR2250.

### **ENGR3240 Tell the Story of What You Make**

How do engineers creatively engage with multiple audiences and stakeholders for their work? Telling stories is critical for anyone who makes things: communicating technical work to non-experts, creating persuasive arguments for technology adoption, or projecting a future with better engineering in it. This course will cover how stories are built and how to craft your own, exploring communication design in multiple forms of media: print, images, film, music, and more. The course includes excursions to experience location-specific visual representation, multiple individual communication experiments, group collection of media, and a culminating project in which students will tell the story of one of their own projects.

We'll look at how music videos, cereal boxes, advertisements, grocery shopping, infographics and even people's outfits (just to name a few) can inform how you might build an effective story about one of your own projects.

This course is organized into 3 main sections: Introduction, Questions and Project.

**Introduction:** The first 4 lessons and associated assignments will act as a warmup for the class. They will help to develop a common language, encourage students to look more closely at the things around them, introduce critique into the class and set the tone for the course moving forward.

**Questions:** The majority of the class will look at visual communication as it relates to 7 questions which cover core understandings about design. These questions build a basis for a complete critique of a design and also provide a structure on which we will explore specific elements of design such as image, type, context, organization, etc. The questions are 1) Should we do this?, 2) What is the message?, 3) Who is the audience?, 4) Who else is doing this?, 5) What is the concept?, 6) What are the elements?, and 7) How is it organized?

**Project:** The last quarter of the course will be used by students to create a visual project that communicates the story of something that they have made. Parameters for this project are decided on by the class but will include initial exploration rounds, multiple rounds of designs, in-class critique and a final deliverable visual artifact.

Credits: 4 ENGR. Corequisite: ENGR2250.

### **ENGR3242 Quantitative Engineering Design**

The engineering design process can often be completed more quickly and efficiently by applying quantitative analysis at various points. In this course, students will apply their existing skills and knowledge and learn new tools to perform quantitative analysis in the context of the design process, including techniques for validation and verification of results and communicating those results to support and effectively guide design decisions. Introductory modules will involve computation simulation tools (e.g., commercial FEA software), optimization, and system integration. In the later part of the semester, students will define and carry out the full design process, starting and ending with a user, on their own multidisciplinary projects (e.g., electromechanical system or product).

Credits: 4 ENGR. Corequisite: ENGR2250.

### **ENGR3252 Technology, Accessibility, and Design**

This course equips students with an interdisciplinary set of tools to design, build, and critique technologies that mediate access to physical and digital worlds. We will use disability as a lens to examine the ways in which technology (e.g., assistive, medical, consumer) can both enhance and diminish access to economic, social, and informational resources. Students will examine the history of such technologies and analyze modern trends. Building from this perspective, students will learn about design processes and implementation strategies for maximizing the accessibility of the technologies they build.

During the course, student teams will work with a community partner to design a technology to enhance accessibility (along some dimension) for a user group with a disability. Students will learn and employ user-centered approaches throughout the course.

Credits: 4 ENGR. Corequisite: ENGR2250.

### **ENGR3260 Design for Manufacturing**

Design for Manufacturing (DFM) will build the specialized design skills needed to professionally redesign a prototype in order to meet target price, reliability and functionality goals, whether the final market requires a single unit per year (i.e. space systems, like satellites) or fifty thousand units a week (i.e. consumer products). This course will be heavily team and project based and will involve the re-design for manufacture of several products, devices and services at the discretion of the instructor. The overall course projects will incorporate a significant mechanical, electronic and software components (but perhaps not all three in any one project) and will be drawn widely from the consumer, industrial, and sustainable market sectors. Course will potentially involve field trips to manufacturing facilities and invited DFM lecturers as appropriate to support the particular projects offered in a given semester.

Credits: 4 ENGR. Recommended Requisites Shop Training. Hours: 3-6-3. Prerequisite: ENGR2250.

### **ENGR3290 Design Justice Studio (formerly ADE)**

This course engages students in community-based, participatory design and action. Teams partner with communities and organizations to achieve positive social and environmental impact with a strong justice framing, working for change in areas like air quality, community development, food processing, global health, and rights and privacy (addressing mass incarceration) over several semesters.

Guided by an experienced faculty advisor, teams make change through design for impact, social entrepreneurship, community organizing, participatory research, political advocacy and other practices. All teams practice social benefit analysis, theory of change, assumption testing, cross-cultural engagement tools, dissemination of innovation methods, and ethical norms.

Students regularly engage stakeholders in inclusive processes, in person and virtually, to observe, strategize, plan, co-design, prototype, test, and implement approaches supported by a significant project budget. There are often opportunities to travel locally, nationally, or internationally to work with partners.

Students are exposed to mindsets and dispositions for working with integrity and responsibility in their stakeholders' contexts through guided exercises, case studies, guest speakers, readings, and reflections. Students learn and apply changemaking practices through project work, and gain essential experience building relationships across difference and developing their own self- and cultural awareness.

This course is part of the BOW collaboration, offered jointly between Olin and Babson, and open to Wellesley students. Olin students can elect ADE to fulfill the Engineering Capstone requirement by registering for ENGR 4290 for two consecutive semesters beginning in the second semester of their junior year or the first semester of their senior year. Alternatively, students can take this course for one semester to fulfill the Design Depth requirement by registering for ENGR 3290. Students that take ENGR 3290 in their second semester junior year can opt to switch to ENGR 4290 for capstone credit.

Credits: 4 ENGR. Hours: 2-2-8. Prerequisite: ENGR2250.

### **ENGR3299 Special Topics in Design Engineering**

Special Topics in Design Engineering classes (ENGR3299X) typically cover a specific topic in Design Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Corequisite: ENGR2250.

### **ENGR3330 Mechanical Design**

This course integrates basic mechanical sciences for application to machine design. Topics include stress, strain, deflection, stiffness, and failure of mechanical components including springs, bearings, gears, shafts and axles; steady and time-dependent loading; mechanical fastening and joining; and power transmission. Techniques for quantitative analysis and design optimization are introduced. The material of this course significantly draws and builds upon the concepts presented in ENGR 2320. Students will carry out a major design project.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2320.

### **ENGR3345 Mechanical and Aerospace Systems**

Fundamental techniques for the analysis of the dynamic behavior of mechanical and aerospace systems are studied through modules that involve both computational simulation and experimental measurements. Topics will be selected from multi-degree-of-freedom systems, attitude dynamics and control, aerodynamics, astrodynamics, flexible structures, and aeroelasticity. The modules will run in parallel with a course-long project involving quantitative-analysis-based design, fabrication, evaluation, and refinement of a system to meet user-specified requirements and performance objectives.

Credits: 4 ENGR. Recommended Requisites one of ENGR2320, ENGR2330 or ENGR2340. Hours: 4-0-8.

### **ENGR3350 Finite Element Analysis**

Computational simulation based on finite element methods is routinely used in engineering, especially in product design and development. In fact it is likely that the design and fabrication of any human-made, commercially-produced structure or mechanical system that you have come in contact with has been guided by finite element analysis. We'll start with fundamentals principles of FEA focusing on proper usage rather than mathematical theory. You'll learn to apply common analysis processes (e.g., static, dynamic, modal, thermal-mechanical, explicit dynamic). You'll then define your own project(s) where you will apply these tools for quantitative analysis.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2320.

### **ENGR3360 Thermal-Fluid Systems Analysis**

This course builds on the basic physics of energy, mass, and momentum conservation to enable analysis and design of open thermal-fluid systems. Conservation laws are used to analyze the efficiency of open non-combustion cycles, such as the organic Rankine cycle, with a particular focus on heat pumps. Students analyze heat and momentum transport using the heat equation and the Navier-Stokes equations. The pure substance model is used in tandem with heat and momentum conservation to design heat exchangers and model phase change processes. Students complete open-ended projects analyzing thermal systems of interest.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2360; OR ENGR2355 AND ENGR2365.

### **ENGR3370 Controls**

This course explores the techniques for changing the dynamics of a system using feedback control. The first portion of the course covers methods for analyzing the open-loop dynamics of generic systems in the frequency-domain (transfer functions) and time-domain (state-space equations). Then we will develop feedback techniques for shaping the system response. Students completing this course will have the analytical tools for controller design (both classical and modern) as well as a fundamental understanding of the concepts behind feedback control (stability, performance, controllability, observability, etc.). Students will have ample opportunity to experiment with control design by implementing their own designs in analog and digital hardware. Examples from field robotics, aircraft, and intelligent-structures will be used for both in-class and hands-on demonstrations.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGX2134, AND either ENGR2340 or ENGR2410.

### **ENGR3390 Fundamentals of Robotics**

This course encompasses the fundamentals of perception, sensors, computer vision, navigation, localization, actuation, manipulation, mobility (e.g., walk, swim, roll, crawl, fly), and intelligence (e.g., control, planning, and mission execution). The course is built around the review and discussion of seminal technical papers in the robotics field with guest lecturers both from various Olin faculty and from external leaders in the robotics community. There is a significant project component to help solidify key concepts.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2110.

### **ENGR3392 Robotics Systems Integration**

This course combines the components of Fundamentals of Robotics (sensing, cognition and actuation) into the testing and deployment of fully-working interdisciplinary robotic systems. There is a significant lab-based component in which teams of students compete in several main industrial robotics areas to optimize mission performance under real world time constraints.

Previous projects include: the design of a robot arm and vision system that plays checkers against human opponents; the design of closed-loop-controlled unmanned ground vehicles to autonomously circumnavigate the Olin Oval, and the design of an intelligent assembly system for autonomous processing of multi-well bio-assay trays.

Credits: 4 ENGR. Recommended Requisites Fundamentals of Robotics or Computational Robotics. Hours: 4-0-8.

### **ENGR3399 Special Topics in Mechanical Engineering**

Special Topics in Mechanical Engineering classes (ENGR X399) typically cover a specific topic in Mechanical Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Recommended Requisites Junior or Senior standing; or permission of instructor.

### **ENGR3410 Computer Architecture**

This course introduces a broad range of computation structures used in computation, from logic gates to specialized (e.g. DSP, cellular automata) as well as general purpose architectures. Design techniques for quantitatively optimizing performance are also taught. Students build a computer from the ground up.

Credits: 4 ENGR. Hours: 4-4-4. Prerequisite: ENGR1125.

**ENGR3415 Digital Signal Processing**

Signal processing - the modeling, transformation, and manipulation of signals and their content - underpins virtually all facets of our daily lives due to the coupling of computing and communications in consumer, industrial, and public sector applications. Discrete-time signals, obtained through the sampling of continuous-time signals, and their frequency domain equivalents, can undergo transformation via systems, e.g., finite-duration impulse response (FIR) and infinite-impulse response (IIR) filters. Digital filter design and analysis conjoins such topics as difference equations, the z-transform, stability, frequency response, the discrete Fourier transform, FFT algorithms, windowing, practical implementation structures, A/D and D/A conversion techniques. After researching signal processing applications during the first part of the course, students initiate and realize individual DSP projects by end-of-term.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2410.

**ENGR3420 Intro Analog and Digital Communication**

This course teaches students design techniques for analog and digital communications, including elementary coding and information theory. Topics also include modulation schemes, data compression, error detection and correction, encryption, transmitter and receiver design, and routing protocols. Students build an operative communications link over an unreliable channel.

Credits: 4 ENGR. Recommended Requisites ENGR 2410 or Permission of Instructor. Hours: 4-4-4.

**ENGR3426 Mixed Analog-Digital VLSI**

This course will provide an overview of mixed-signal (analog and digital) integrated circuit design in complimentary metal-oxide (CMOS) technologies. Students will learn transistor-level design of digital and analog circuits, layout techniques for digital and analog circuit modules, and special physical considerations that arise in a mixed-signal integrated circuit. Students will design a custom mixed-signal integrated circuit that could be sent out for fabrication at the end of the semester if a suitable fabrication vehicle is available.

Credits: 4 ENGR. Hours: 4-4-4. Prerequisite: ENGR2420.

**ENGR3430 Eelectronics**

Through a series of projects, students will learn all aspects of printed-circuit board (PCB) design at the prototype scale of manufacturing, including electronic circuit/system design, component selection, schematic capture, PCB layout, assembly, and testing. Familiarity with circuits, electronics, and firmware development at the levels of ISIM (ENGR 1125) and PoE (ENGR 2110) are required to take the course. This course satisfies the ECE elective requirement.

Credits: 4 ENGR. Hours: 3-3-6. Prerequisite: ENGR1125 AND ENGR2110.

**ENGR3499 Special Topics in Electrical & Computer Engineering**

Special Topics in Electrical and Computer Engineering classes (ENGR X499) typically cover a specific topic in Electrical and Computer Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Recommended Requisites ISIM and Circuits strongly recommended; junior or senior standing; interested sophomores should contact the instructor to discuss enrollment options.. Prerequisite: ENGR2410.

### **ENGR3515 Data Structures and Algorithms**

In this course, you will be introduced to the common data structures and algorithms that will enable you to grow as a programmer and problem solver. You will learn how to do mathematical analysis of data structures and algorithms, including run time analysis and proof of correctness. But you will also be practicing how to implement these concepts and evaluating performance in practice. By the end, you should feel comfortable approaching a computational problem from start to finish: writing pseudocode, choosing appropriate data structures, designing algorithms, and analyzing your program.

Credits: 4 ENGR. Recommended Requisites MTH2110, Discrete Mathematics recommended co-requisite, or prior to enrolling. Prerequisite: ENGR2510.

### **ENGR3520 Foundations of Computer Science**

This course uses applications as vehicles for exploring the formal analytic toolkit of the computer scientist as well as aspects of algorithmic computing and intelligent software design. The course combines elements of automata theory, data structures and algorithms, programming languages, artificial intelligence, information management, and internet programming.

Credits: 4 ENGR. Recommended Requisites ENGR2510 or permission of instructor. MTH2110, Discrete Mathematics should be taken along with FOCS or prior to enrolling.. Hours: 4-0-8.

### **ENGR3525 Software Systems**

An introduction to the design and implementation of system-level software, including operating systems, networks, and databases. Topics include processes and threads, memory and storage management, networking and inter-process communication, scheduling and synchronization.

Note: Permission of instructor may be obtained in lieu of prerequisite if appropriate.

Credits: 4 ENGR. Hours: 3-0-9. Prerequisite: ENGR2510.

### **ENGR3531 Data Science**

Data Science is a powerful toolkit for using data to answer questions and guide decision making. It involves skills and knowledge from statistics, software engineering, machine learning, and data engineering. In this class, students work on data science projects that involve collecting data or finding data sources, exploratory data analysis and interactive visualization, statistical analysis, predictive analytics, model selection and validation. Course work involves readings and case studies on ethical practice in data science.

This course may be used to satisfy the Probability and Statistics requirement.

Credits: 2 ENGR. Recommended Requisites ENGR2510: Software Design or permission of instructor. Concurrent Requisites: MTH2131.

### **ENGR3537 Machine Learning**

Machine learning is rapidly reshaping how we live our lives. Machine learning approaches have driven recent progress in an array of technologies that have the potential to realize huge positive impacts on our world (e.g., autonomous driving, language translation, personalized recommendation, large language models, etc). However, the influence of machine learning does not end with these highly visible technologies. Machine learning algorithms are impacting our world in ways that are far less known to the general public, such as in job applicant evaluation, criminal justice, finance, politics, and medicine.

The principal aim of this course is to equip students with a multi-faceted and interdisciplinary skill set to understand, implement, and critically evaluate machine learning systems. In service of this goal, students will learn the major algorithmic and mathematical frameworks that undergird modern machine learning methods. Students will learn effective processes for implementing, testing, and refining machine learning systems across a range of application domains. Students will learn how the decisions that machine learning practitioners make interact with larger societal contexts by considering factors such as transparency, fairness, bias, and privacy.

Credits: 2 ENGR. Hours: 4-0-8. Prerequisite: ENGR2510 AND ENGX2006; OR ENGX2005.

### **ENGR3540 Complexity Science**

The study of complex systems represents a new approach to science that investigates how relationships between parts give rise to the collective behaviors of a system and how the system interacts and forms relationships with its environment. (Wikipedia)

This class is about complexity science, data structures and algorithms in Python, and the philosophy of science:

1. Complexity science is an interdisciplinary field

â€"at the intersection of mathematics, computer science and other disciplines such as physics and economics

â€"that focuses on models of systems with many components, local interactions, and complex behavior. These models are often characterized by structure, rules and transitions rather

than by equations.

2. Data structures and algorithms in Python: This class picks up where Software Design leaves off, introducing

additional data structures, algorithms, language features, design patterns, and software engineering tools that are appropriate for modeling, simulating and analyzing complex systems.

3. Philosophy of science: The models and results in this class raise a number of questions relevant to the philosophy of science

â€"including the nature of scientific laws, theory choice, realism and instrumentalism, holism and reductionism

â€"which we will discuss as they arise, along with related readings.

Topics may include the structure and dynamics of complex networks; cellular automata, self-organized criticality, and generative systems; fitness landscape models of biological and technological evolution; and agent-based models of social and economic behavior.

Credits: 4 ENGR. Recommended Requisites ENGR2510 or permission of instructor. Hours: 4-0-8.

### **ENGR3560 Scientific Computing**

How do scientists use computers to understand the natural world? How do you create and test real-world scientific software? Over the course of three projects, you will gain expertise in creating complex scientific software that, for example, simulates how ant trails are formed. You will compare your results to a benchmark, or a real-world result. You will gain experience scoping a software project (a notoriously difficult task), practice skills such as refactoring, increasing code speed, providing feedback on other people's code, and presenting your results in a way that is clear and exciting to your audience. This course includes agent-based models; although we focus on scientific applications the skills you will learn are broadly applicable to the creation of computer graphics and robotics.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: ENGR2510.

### **ENGR3590 Computational Intro to Robotics**

This course will provide a computationally-focused introduction to the field of robotics. Students will learn how to both select and design algorithms for solving interesting problems in robotic perception and control. Additionally, students will learn to successfully balance tradeoffs between accuracy of an algorithm and its computational efficiency in both space and time. The course will move from structured labs to more open-ended projects as the semester progresses. Specific content areas that the course may address are: computer vision, machine learning, reinforcement learning, path planning, mapping and localization.

Credits: 4 ENGR. Prerequisite: ENGR2510.

### **ENGR3599 Special Topics in Computing**

Special Topics in Computing classes (ENGR X599) typically cover a specific topic in Computing and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Prerequisite: ENGR2510.

### **ENGR3635 Neurotechnology, Brains and Machines**

Neurotechnology falls in the intersection of engineering, data science, and neuroscience. This area involves work in how humans can use machines to understand how we think and how to make machines that can think. Advances in neurotechnology will likely lead to new treatments for brain disorders, repair and augmentation of our sensory and motor systems, and shifts in computation strategies. In this course, students will learn about cutting-edge technologies used to understand and emulate the brain, develop statistical data analysis skills to conduct and understand neurotechnology research, and discuss the cultural and ethical implications of these advances. Course work will involve analysis of data from neuroscience, reading and synthesizing articles from research journals, and project work.

Credits: 2 ENGR. Concurrent Requisites: MTH2135.

### **ENGR3699 Special Topics in Bioengineering**

Special Topics in Bioengineering classes (ENGR X699) typically cover a specific topic in Bioengineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR.

### **ENGR3820 Failure Analysis and Prevention**

In this class, we learn failure analysis by doing failure analysis. By planning and implementing hands-on investigations in a laboratory setting, we will gain practical experience in the analysis of engineered components and systems that fail in expected or unexpected ways. Case study readings and class discussions will help us develop an understanding of technical topics such as failure analysis methodology, fracture classifications and micromechanisms, corrosion and degradation, and materials selection and design decision-making. Self-directed projects will enable skill building in laboratory methods and advanced materials characterization techniques, such as scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), optical microscopy, and fracture surface sample preparation.

We won't stop there. We will broaden our learning by critically analyzing how "engineering" failures intersect issues of economics, policy, regulation, justice, and ethical decision-making in complex systems. We will pay particular attention to the social and environmental consequences of larger systemic failures by examining concrete case studies (e.g., the Flint water crisis, Love Canal, e-waste in Guiyu) as well as more abstract and aspirational models for the future (e.g., material circularity, extended producer responsibility).

Written and oral communication assignments will support development of professional skills in synthesizing laboratory and research data, developing and supporting technical arguments, and contextualizing our findings.

This course is cross-listed with SCI3420.

Credits: 4 ENGR. Hours: 4-0-8. Prerequisite: Prerequisite required of a foundation materials science course..

### **ENGR3899 Special Topics in Materials Science**

Special Topics in Engineering classes (ENGR X899) typically cover a specific topic in Materials Science Engineering and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits ENGR. Recommended Requisites Prerequisite required of a foundation materials science course.<br /><br />. Prerequisite: SCI1410.

### **ENGR3997 Directed Research in Robotics**

This course is offered by robotics faculty and covers diverse topics that range from 1 to 4 credits and may be completed in one or multiple semesters. The course provides students the opportunity to gain research experience on topics of interest. The required deliverables for successful completion of Directed Research are defined by the faculty offering the course and take into account the credits and topic involved.

Credits: Variable Credits ENGR. Recommended Requisites Foundational courses (Fundamentals of Robotics and Computational Robotics). Hours: 0-2-10.

### **ENGR3999 Special Topics in Robotics**

Special Topics in Robotics Engineering classes (ENGR3999) typically cover a specific topic in Robotics and are intended to enhance and expand the selection of offerings from semester to semester. Specific topics may be found in the semester materials.

Credits: Variable Credits ENGR. Recommended Requisites Foundational courses (Fundamentals of Robotics and Computational Robotics). Hours: 4-0-8.

### **ENGR4190 SCOPE: Senior Capstone Program in Engineering**

SCOPE is one of the two Engineering Capstone requirements for all Olin students. It incorporates formal, team-based, year-long engineering projects done in conjunction with 10 to 14 external companies. Each project will be executed by a single student team, supported by a dedicated faculty member, in partnership with one of these companies. Each student team will have between four and six members from the senior class. Students may conduct advanced research, perform market analysis, develop experimental prototypes, design new products or redesign existing products in the execution of this project.

As SCOPE is an 8 credit, year-long, fall/spring offering, a single grade will be given upon completion of 8 credits of SCOPE. After completion of the fall semester, a TBG grade will appear upon a student's transcript until a grade is assigned at the end of the spring. The single grade assigned will appear in both the fall and the spring on transcripts. Students not completing a second semester of SCOPE will receive a grade for the fall and will therefore not satisfy the requirement of engineering capstone with the SCOPE program. Note that students not performing adequate work in the fall semester will receive an end-of-semester notice of concern (see the Grading at Olin section of the Olin College Catalog for more information).

Note: Cross-registered and Exchange students must obtain permission from the SCOPE Director to enroll.

Credits: 4 ENGR. Recommended Requisites Must be a senior.

### **ENGR4290 Design Justice Studio Capstone (formerly ADE)**

This course engages students in community-based, participatory design and action. Teams partner with communities and organizations to achieve positive social and environmental impact with a strong justice framing, working for change in areas like air quality, community development, food processing, global health, and rights and privacy (addressing mass incarceration) over several semesters.

Guided by an experienced faculty advisor, teams make change through design for impact, social entrepreneurship, community organizing, participatory research, political advocacy and other practices. All teams practice social benefit analysis, theory of change, assumption testing, cross-cultural engagement tools, dissemination of innovation methods, and ethical norms.

Students regularly engage stakeholders in inclusive processes, in person and virtually, to observe, strategize, plan, co-design, prototype, test, and implement approaches supported by a significant project budget. There are often opportunities to travel locally, nationally, or internationally to work with partners.

Students are exposed to mindsets and dispositions for working with integrity and responsibility in their stakeholders' contexts through guided exercises, case studies, guest speakers, readings, and reflections. Students learn and apply changemaking practices through project work, and gain essential experience building relationships across difference and developing their own self- and cultural awareness.

This course is part of the BOW collaboration, offered jointly between Olin and Babson, and open to Wellesley students. Olin students can elect ADE to fulfill the Engineering Capstone requirement by registering for ENGR 4290 for two consecutive semesters beginning in the second semester of their junior year or the first semester of their senior year. Alternatively, students can take this course for one semester to fulfill the Design Depth requirement by registering for ENGR 3290. Students that take ENGR 3290 in their second semester junior year can opt to switch to ENGR 4290 for capstone credit.

Credits: 4 ENGR. Hours: 2-2-8. Prerequisite: ENGR2250.

### **ENGR4599 Engineering Capstone Alternative**

This course serves as an alternative to the Engineering Capstone and meets all criteria for senior level cumulative engineering experiences.

The current offering is: The Tech Venture Capstone (TVC). TVC enables students to gain professional experience undertaking an authentic, team-based engineering project in the context of a prospective new venture. TVC is being offered on an experimental basis as a two semester sequence that fulfills the Engineering Capstone requirement.

Mastering key elements will prepare students for starting or contributing at a high level to an early stage company. These elements include: Understanding major user pain points and the value of a solution; understanding the market and segmentation (first/early market, beachhead; customer/user persona; customer buying habits/process); understanding how to go from a prototype to a manufacturable product for a specific customer (problem you are to solve; value of the solution for the customer; product vision; minimum viable product; prototype & productization; production, supply chain, BOM; product validation; quality & compliance; schedule, timing, launch; user experience). By the end of this capstone experience, students will be prepared to face the challenges of productizing prototypes to match market needs.

Assessment will be similar to SCOPE, with students evaluated on a combination of their individual learning goals, contribution to their team, and successful execution of the project. (Students are not evaluated on the success of the venture itself.)

Credits: 4 ENGR. Recommended Requisites Registration notes: Students must be in at least their sixth semester of study, and have successfully completed Products and Markets (AHSE 1515) and User-Oriented Collaborative Design (ENGR 2250).. Prerequisite: AHSE1515 AND ENGR2250.

## **MTH - Mathematics**

### **MTH1111 Modeling and Simulation of the Physical World**

This course provides an introduction to mathematical modeling and computer simulation of physical systems. Working with a broad range of examples, students practice the steps involved in modeling and analyzing a physical system, learn the role of models in explaining and predicting the behavior of the physical world, and develop skills with the programming and computational tools necessary for simulation. Students work in a studio environment on increasingly open-ended projects, and learn how to present their results, with an emphasis on visual and oral communication. (This course is taken with SCI1111.)

Credits: 2 MTH. Concurrent Requisites: SCI1111. Hours: 3-0-3.

### **MTH1199 Special Topics in Mathematics**

Special Topics in Mathematics classes (MTH X199) typically cover a specific topic in Mathematics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits MTH.

### **MTH2110 Discrete Math: Combinatorics and Graph Theory**

Discrete Mathematics is a course that will introduce students to advanced counting and partitioning techniques as well as widely applicable discrete structures such as graphs and trees. This class will emphasize creative problem solving, mathematical writing, and collaboratively carrying out small-group projects. Â

Credits: 4 MTH. Hours: 4-0-8.

### **MTH2130 Probability and Statistics**

An introduction to probability and statistics, with applications to science, engineering, and social science. Topics include discrete and continuous probability distributions; moments; conditional probability; Bayes' Rule; point and interval estimation; hypothesis testing.

Credits: Variable Credits MTH. Hours: 2-0-4.

### **MTH2131 Data Science**

Data Science is a powerful toolkit for using data to answer questions and guide decision making. It involves skills and knowledge from statistics, software engineering, machine learning, and data engineering. In this class, students work on data science projects that involve collecting data or finding data sources, exploratory data analysis and interactive visualization, statistical analysis, predictive analytics, model selection and validation. Course work involves readings and case studies on ethical practice in data science.

This course may be used to satisfy the Probability and Statistics requirement.

Credits: 2 MTH. Concurrent Requisites: ENGR3531.

### **MTH2135 Neurotechnology, Brains and Machines**

Neurotechnology falls in the intersection of engineering, data science, and neuroscience. This area involves work in how humans can use machines to understand how we think and how to make machines that can think. Advances in neurotechnology will likely lead to new treatments for brain disorders, repair and augmentation of our sensory and motor systems, and shifts in computation strategies. In this course, students will learn about cutting-edge technologies used to understand and emulate the brain, develop statistical data analysis skills to conduct and understand neurotechnology research, and discuss the cultural and ethical implications of these advances. Course work will involve analysis of data from neuroscience, reading and synthesizing articles from research journals, and project work.

Credits: 2 MTH. Concurrent Requisites: ENGR3635.

### **MTH2136 Astronomy and Statistics: AstroStats**

It's not science unless you quantify your errors. Learn statistics and error analysis by studying our dynamic solar system. The first half of the class will provide you with a toolbox of standard statistical methods. You will learn these methods by studying data from planets, moons, and asteroids. The second half consists of student-designed projects. Your project will investigate an element of our solar system, and will include rigorous error analysis. This course will use data from NASA and ESA missions.

Credits: 2 MTH. Recommended Requisites Some experience with Python. Concurrent Requisites: SCI2136. Hours: 3-0-9.

**MTH2137 Machine Learning**

Machine learning is rapidly reshaping how we live our lives. Machine learning approaches have driven recent progress in an array of technologies that have the potential to realize huge positive impacts on our world (e.g., autonomous driving, language translation, personalized recommendation, large language models, etc). However, the influence of machine learning does not end with these highly visible technologies. Machine learning algorithms are impacting our world in ways that are far less known to the general public, such as in job applicant evaluation, criminal justice, finance, politics, and medicine.

The principal aim of this course is to equip students with a multi-faceted and interdisciplinary skill set to understand, implement, and critically evaluate machine learning systems. In service of this goal, students will learn the major algorithmic and mathematical frameworks that undergird modern machine learning methods. Students will learn effective processes for implementing, testing, and refining machine learning systems across a range of application domains. Students will learn how the decisions that machine learning practitioners make interact with larger societal contexts by considering factors such as transparency, fairness, bias, and privacy.

Credits: 2 MTH. Concurrent Requisites: ENGR3537. Hours: 4-0-8.

**MTH2188 Designated Alternative in Mathematics**

Designated Alternatives in Mathematics courses (MTH X188) typically cover mathematical topics in a required subject. Offerings under this title provide approved substitutions for an Olin requirement. They vary from semester to semester and are intended to expand the selection of offerings.

Credits: Variable Credits MTH. Concurrent Requisites: SCI2099.

**MTH2188A Designated Alternative in Mathematics**

Designated Alternatives in Mathematics courses (MTH X188) typically cover mathematical topics in a required subject. Offerings under this title provide approved substitutions for an Olin requirement. They vary from semester to semester and are intended to expand the selection of offerings.

Credits: Variable Credits MTH. Concurrent Requisites: SCI2099A.

**MTH2188B Designated Alternative in Mathematics**

Designated Alternatives in Mathematics courses (MTH X188) typically cover mathematical topics in a required subject. Offerings under this title provide approved substitutions for an Olin requirement. They vary from semester to semester and are intended to expand the selection of offerings.

Credits: Variable Credits MTH.

**MTH2199 Special Topics in Mathematics**

Special Topics in Mathematics classes (MTH X199) typically cover a specific topic in Mathematics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits MTH. Concurrent Requisites: ENGR3599B.

### **MTH3120 Partial Differential Equations**

An introduction to the solution methods of partial differential equations that arise in describing a wide variety of problems in engineering, such as in fluid dynamics, elasticity, electromagnetic wave propagation, and transport phenomena. The course begins with the solution of boundary-value problems in ordinary differential equations (Sturm-Liouville theory), and then develops into the fundamentals of Fourier analysis and the solutions to the heat, wave, and Laplace's equations on finite and infinite domains. Additional topics will be addressed at the discretion of the instructor(s), examples of which include systems of hyperbolic equations, similarity solutions in infinite domains, or a brief introduction to numerical solutions.

Credits: 4 MTH. Recommended Requisites Linear Algebra, Vector Calculus, Differential Equations  
all are met via completion of the Quant Engr Analysis sequence. Hours: 4-0-8. Prerequisite: ENGX2011.

### **MTH3150 Numerical Methods and Scientific Computing**

The speed of modern computers has allowed simulation to become a very powerful tool in the design and analysis of systems in science and engineering. This power is easily misused and scientific computing is full of pitfalls. This course introduces students to methods useful for accurately simulating complex systems in the physical sciences and engineering. The first half of the course focuses on iterative techniques for solving algebraic systems, interpolation of functions, and advanced techniques for solutions to ordinary differential equations. The second half of the course focuses on an introduction to solutions to boundary-value problems and solutions to partial differential equations, with the students required to choose an application in science and engineering to solve in detail.

Credits: 4 MTH. Hours: 4-0-8.

### **MTH3170 Nonlinear Dynamics and Chaos**

This course will focus on the modern theory of dynamical systems including both discrete and continuous processes. The course will emphasize both theory and applications. Theory topics might include, for example, linear and nonlinear stability theory, periodic solutions, bifurcation theory, chaos, and strange attractors. Applications discussed might include, for example, mechanical oscillators and biological oscillators.

Credits: 4 MTH. Hours: 4-0-8.

### **MTH3199 Special Topics in Mathematics**

Special Topics in Mathematics classes (MTH X199) typically cover a specific topic in Mathematics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits MTH.

## **OFYI - Olin First Year Introduction**

### **OIE1000 Olin First Year Introduction OFYI**

Olin Introductory Experience is a first-year course that serves an introduction to different aspects of life and resources at Olin and a general first-year experience course. Students experience and examine different aspects of Olin's culture and tools are provided to assist with the transition to college and beyond. Teaming and feedback, professionalism, space stewardship and ethics, mental health, financial literacy, identity formation and diversity, academic support, post-graduate planning, and curriculum and registration are some examples of topics that are covered in this course, though topics may shift depending on the needs of the students and community.

Credits: 1 OIE. Hours: 1-0-3.

## SCI - Science

### **SCI1111 Modeling and Simulation of the Physical World**

This course provides an introduction to mathematical modeling and computer simulation of physical systems. Working with a broad range of examples, students practice the steps involved in modeling and analyzing a physical system, learn the role of models in explaining and predicting the behavior of the physical world, and develop skills with the programming and computational tools necessary for simulation. Students work in a studio environment on increasingly open-ended projects, and learn how to present their results, with an emphasis on visual and oral communication. (This course is taken with MTH1111.)

Credits: 2 SCI. Concurrent Requisites: MTH1111.

### **SCI1199 Foundation Topic in Physics**

Foundation Topics in Physics classes (SCI X199) typically cover an introductory topic in Physics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: 4 SCI.

### **SCI1210 Principles of Modern Biology with Laboratory**

Most of the course material is concerned with our current understanding of the fundamentals of life at the molecular and cellular level. Concepts and information from the disciplines of biochemistry, molecular biology, genetics, evolutionary and cell biology contribute in different ways to provide a coherent view of the components, processes, interdependencies, and other properties common to all organisms. The structure and regulation of genes, properties and synthesis of proteins, and the organization and communication between cells and multi-cellular organisms are essential elements for cellular growth and differentiation that will be studied in detail. Special topics to be considered include, but are not limited to, human genetics, molecular medicine, cancer biology, evolution, genomics, synthetic biology, and ethical implications of the applications of biological research. Students will gain experience with research methods and scientific reasoning through laboratory section experiments, written laboratory research summaries and from other project work.

Credits: 4 SCI. Concurrent Requisites: SCI1210 L. Hours: 4-3-5.

### **SCI1230 Think Like a Biologist with Laboratory**

In this survey course we learn fundamental principles of biology through a journey through the field from the molecular to systems levels. We examine different classes of biological problems and interactions across multiple scales through reading and discussion of primary and secondary literature in the field. We draw on examples from the environment, microbiology, biomimicry, and current events. Through analysis of numerous examples we uncover key principles of biology, a toolkit of which can be applied towards examining and solving multifaceted problems. Projects include examination of biology in the context of systems and exploration of ways in which biology informs interdisciplinary problem solving. Through projects and work in the laboratory students develop a practical and foundational understanding of biological principles and practice.

Credits: 4 SCI.

### **SCI1240 Designing Better Drugs with Laboratory**

This class addresses the engineering grand challenge of “Engineering Better Medicines”. In this class, students will learn to apply concepts and laboratory skills that are currently used in biological research to solve problems in health and disease and drug discovery and development. Students will also develop skills in technical writing and oral communication, and they will gain experience with the basics of designing, conducting and evaluating laboratory experiments. Students will demonstrate an understanding of the larger societal context in which biological concepts, tools and research play a role in everyday life and medicine, and how societal context shapes the advancement of research in biology and medicine.

Credits: 4 SCI.

### **SCI1250 Six Microbes that Changed the World with Laboratory**

Penicillium. Vibrio cholerae. Escherichia coli. Yeast. The Archaea. Microbes surround us, and impact our lives, our health, our societies, and our environment. Research with microbes, the smallest of all living creatures, has enabled discovery and understanding of the fundamental workings of life, opens up rich historical narratives of diseases and cures, and may provide sustainable solutions to problems we face from bioremediation to bioenergy. We will use six influential microbes as a window into a rich study of the interactions between science and societal context. This course connects biological concepts and historical knowledge through discussions, integrated assignments, presentations, and hands-on laboratory activities. Let's explore the thrill of biology and history, together.

Credits: 4 SCI. Concurrent Requisites: AHSE2150.

### **SCI1260 The Intersection of Biology, Art and Technology (IBAT)**

This project-based course will encourage participants to cross boundaries between art, biology and technology with hands-on projects inspired by contemporary and historical work in these fields. How might biology inform art practice and how might art inform biology? What role does technology play in advancing or restricting each field and how might art and biology inspire technological breakthroughs? What are the implications of being able to change the genome of an organism? What is art anyway? These are just some of the questions we will pursue during this course. We will begin the course with an investigation of the phenomena of climate change and consider what steps we might take individually and collectively to contribute to the sustainability of the planet. Visualization technologies such as the scanning electron microscope (SEM) will be utilized to observe and create artworks. Final student-designed projects are informed by biology, art and technology and encourage deep exploration and integration of these topics. Laboratory studies will enhance an understanding of biology and its relation to technology as well as providing a possible means to create art. We will delve into a variety of written works, films and video resources, and listen first-hand to practitioners in these areas about the challenges and rewards of interdisciplinary work in fields that most would regard as unrelated. The goal by the end of the course is to acquire an attitude that allows fluid movement from one field to the other in thinking and doing so as to garner creative strength not possible from study of each field alone.

Credits: 4 SCI. Concurrent Requisites: AHSE2160.

**SCI1270 BCB: Biomes, Climate Change, and Biodiversity**

Biology, by definition, is the study of life. In this course we will travel from the biosphere to the molecular level as we learn about how life works and the intersections between global warming and the resultant changes to climate that affect all organisms that inhabit planet Earth. Student experience will preference hands-on project-based learning including an experiential learning opportunity in the biology laboratory, in the kitchen laboratory learning how to prepare nutritious meatless meals, and there may be opportunities for fieldwork. There will be several student designed projects that encourage creativity and depth of understanding of topics of interest. Basic principles of genetics, evolution and molecular biology will form a framework for comprehensive understanding and from which biodiversity will be studied and biomes understood. Appreciation for the diversity and kinship of all living organisms is one important outcome and it also requires that all of us understand the obligation to stewardship of the earth through efforts to mitigate climate change and make room for wildlife. This course is for anyone interested in the sustainability of our planet from the perspective of biology. As such the course content is inextricably linked to topics such as environmental justice, agricultural practices, and human population growth. This course will fulfill the biology requirement, or it can be used as an E: Sustainability concentration elective.

Credits: 4 SCI. Hours: 4-3-5.

**SCI1299 Foundation Biology Topics (with laboratory)**

This topics course provides flexibility in offering our foundational biology course. Reference semester registration materials for specific offerings.

Credits: 4 SCI.

**SCI1310 Introduction to Chemistry with Laboratory**

This course introduces students to the fundamental aspects of aqueous and solid state chemistry. Topics include stoichiometry, gas laws, atomic structure and bonding, atomic theory, quantum theory, acid/base chemistry, solubility, electrochemistry, kinetics, thermodynamics, and reaction equilibria.

Credits: 4 SCI. Hours: 4-3-5.

**SCI1320 Paper Panacea: Part I with Laboratory**

Paper technology is a nascent, ultra low-cost detection platform that has promise to address several of the United Nations Sustainable Development Goals. In this course, we'll learn (or re-learn!) the chemistry and material science foundations that make this technology work. This will happen through weekly laboratory experiments; about mid-course we will design a class project to advance paper technology together. The course is a means for people to learn: Foundational chemistry and materials science; Collaboration and Innovation; Laboratory skills and Self-directed and Team-based learning skills.

Credits: 4 SCI. Hours: 2-4-6.

**SCI1399 Special Topics in Chemistry**

Special Topics in Chemistry classes (SCI X399) typically cover a specific topic in Chemistry and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI.

### **SCI1410 Materials Science and Solid State Chemistry**

This laboratory-based course introduces students to the relationships among structure, processing, properties, and performance of solid state materials including metals, ceramics, polymers, composites, and semiconductors. Topics include atomic structure and bonding, crystallography, diffusion, defects, equilibrium, solubility, phase transformations, and electrical, magnetic, thermal, optical and mechanical properties. Students apply materials science principles in laboratory projects that emphasize experimental design and data analysis, examination of material composition and structure, measurement and modification of material properties, and connection of material behavior to performance in engineering applications.

Credits: 4 SCI. Hours: 3-3-6.

### **SCI1420 Metals, Mining, and the Environment**

This course explores materials science through the lens of metallic materials and their environmental and social impacts. From iron and aluminum in mechanical structures, to cobalt and rare earth metals in electronics and renewable energy applications, today's technologies rely on metals and alloys for their unique physical and chemical properties. Metals are part of a larger technological system, however, with complex social, environmental, political, economic, and ethical implications. Through a series of projects, students in this class will explore the technical processing, microstructure, and behaviors of metallic materials, while researching and discussing sustainability issues related to mining operations, raw material processing, and recycling and disposal. We will critically examine the social and environmental costs of the metals industry and metallic products, and consider our professional and ethical responsibilities as scientists, engineers, designers and global citizens to address larger problems or initiate positive change. Teams will implement self-directed projects guided by their own interests and goals, and produce a range of project deliverables that reflect an interdisciplinary understanding of metallic materials and their impacts.

Credits: 4 SCI. Hours: 6-0-6.

### **SCI1430 Plastic Planet**

This course explores materials science and solid-state chemistry through the lens of plastics and their environmental and social impacts. The world is creating plastic materials at a staggering rate, with annual global production approaching 400 million tonnes. While plastics play critical roles in health, food packaging, transportation, and construction, the exponential demand for plastics raises significant questions about the human and ecosystem impacts of polymeric materials. For example, only small fractions of plastics are recycled, and recent policy shifts have left many countries struggling to manage their plastics waste streams. Through a series of self-directed team projects, students in this class will explore technical and contextual issues related to plastics processing, use, and disposal, such as the rise of single-use plastics, toxic chemicals and pollutants from polymer synthesis, biodegradation and recycling, life-cycle assessment of plastics versus alternative materials, and larger systemic challenges associated with the plastics industry. The course takes place in a studio-laboratory setting, where teams will implement and troubleshoot project plans, apply a range of materials testing and analytical techniques, and conduct research and reporting that enables critical thinking and reflection on the benefits and consequences of plastics technologies.

Credits: 4 SCI. Hours: 6-0-6.

### **SCI1440 Materials Creation, Consumption, and Impact**

This course introduces materials science and solid-state chemistry via open-ended explorations of the materials we encounter in our everyday lives. In a series of team-based analytical projects, students select materials products or processes, and design experiments to answer materials-related questions that are personally interesting and culturally relevant. Each project integrates concepts and questions about the impacts of materials on our world, e.g., the toxicity of materials in consumer products, the energy of material processing, the recyclability or biodegradability of common plastics, or the social impacts of extractive industries and consumer cultures. The self-directed project work, combined with structured assignments, enable students to think critically about the connections among material chemistry, structure, processing, properties, and impacts. A variety of project deliverables help students gain skills in synthesizing, contextualizing, and communicating ideas and insights. In short, this course enables students to explain how materials behave, why they behave that way, and why it matters for maximizing technical performance or minimizing negative impacts on our world.

Credits: 4 SCI. Hours: 6-0-6.

### **SCI2099 Special Topics in Science**

Special Topics in Science classes (SCI X099) typically cover a specific topic in Science and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI.

### **SCI2136 Astronomy and Statistics: AstroStats**

It's not science unless you quantify your errors. Learn statistics and error analysis by studying our dynamic solar system. The first half of the class will provide you with a toolbox of standard statistical methods. You will learn these methods by studying data from planets, moons, and asteroids. The second half consists of student-designed projects. Your project will investigate an element of our solar system, and will include rigorous error analysis. This course will use data from NASA and ESA missions.

Credits: 2 SCI. Recommended Requisites Some experience with Python. Concurrent Requisites: MTH2136. Hours: 3-0-9.

### **SCI2199 Special Topics in Physics**

Special Topics in Physics classes (SCI X199) typically cover a specific topic in Physics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI.

### **SCI2210 Immunology**

Immunology is a relatively new science, and our understanding of our immune system is evolving at a rapid pace. When the immune system functions properly, infectious pathogens and potential cancer cells are destroyed. When our immune system malfunctions, normally harmless microorganisms can cause serious infections, autoimmune diseases or allergies can develop and cancer cells can evade immune surveillance and grow unchecked. In this lecture and discussion-based class, we will investigate the molecular and cellular mechanisms that control our immune responses. Current research in immunology will be emphasized through analysis of primary literature and media articles.

Credits: 4 SCI. Recommended Requisites Foundation Biology, AP Biology score of 4 or 5 (or equivalent), or permission of the instructor. Hours: 4-0-8.

### **SCI2214 Microbial Diversity**

This course is an introduction to the tremendous diversity of the microbial world. The focus will be on the study of environmental bacteria and their metabolic, physiological and genetic diversity. Topics will include: bacterial growth, nutrient cycling, symbiosis, bioremediation, and molecular methods to work with bacteria. A significant portion of the course will involve exploration of the microbial world in the laboratory through authentic research. Students will gain experience with techniques to study a variety of environmental bacteria and learn to use tools in bioinformatics. Students of this course will be able to apply knowledge about microbiology towards development of sustainable biological solutions in a variety of contexts.

Credits: 4 SCI. Hours: 3-3-6. Prerequisite: SCI12.

### **SCI2215 Emerging Technologies in Cancer Research, Diagnosis and Treatmt w/ Lab**

More than thirty years have passed since the declaration of a "War on Cancer", yet nearly 600,000 Americans are predicted to die from cancer this year. This course will examine the environmental and biological causes of cancer. We will explore why traditional treatments (chemotherapy, surgery and radiation) and the early promise of biotechnology have not led to a significant improvement of life expectancy for most forms of cancer. Through analyses of journal articles and clinical trials, we will assess the diverse emerging technologies for cancer research, diagnosis and therapy. Some of the technologies to be explored are immune checkpoint inhibitors, CRISPR, angiogenesis inhibitors, microarrays, stem cell therapy, gene therapy, genomic analysis and biological and immunological modifiers. Class discussion and student presentation of primary literature will be integral parts of this course. The course will include a student-designed laboratory component.

Credits: 4 SCI. Recommended Requisites Foundation Biology, AP Biology score of 4 or 5 (or equivalent), or permission of the instructor. Hours: 2-2-8.

### **SCI2235 Biomimicry**

We can learn from nature! From studying a leaf to make a better solar cell to emulating natural processes to develop living buildings, the discipline of Biomimicry views nature as "model, mentor and measure" (Benyus, 1997). Spiders spin protein silk with the strength of steel yet much lighter all at ambient temperature and pressure. Cuttlefish change color to match their surroundings in milliseconds by contracting their chromatophores and even bioluminesce. In this course we will study wonders like these to appreciate the beauty and sophistication of life by investigating the biological mechanisms and functions of organisms as well as the dynamics of whole ecosystems. By examining biological systems at multiple scales, we can draw insights from understanding how they work. By collecting data, running experiments, creating models, or building prototypes, we can translate these insights into design ideas and practice. We will examine and discuss big ideas and thinking in biology and design and then synthesize and reflect on the intersection of these fields. Students will develop skills and insights through critical analysis of readings and the development of projects that draw on both fields. Biological systems have undergone 3.8 billion years of evolution, resulting in time-tested approaches to living on earth that are efficient and embody sustainability. By exploring the intersection of biology and design, we might learn to do the same.

This course is crosslisted with ENGR3235. Enrollment in SCI2235 is for advanced science credit. If design depth credit or ENGR credit is desired, enroll in ENGR3235 for projects with engineering design foci.

Credits: 4 SCI. Hours: 4-0-8. Corequisite: SCI12.

**SCI2260 Topics in Bioengineering**

Broadly, Bioengineering can be defined as the application of engineering concepts and methods to the solution and study of biological and medical problems. Using a case study approach, this course aims to provide students with a broad understanding of the types of problems Bioengineers explore as well as the engineering and biological methods they employ. We will approach topics through seminar-style discussion of current primary articles from the literature as well as selected hands-on laboratory explorations of topics. Topics to be covered include tissue engineering, use of microfluidics devices for diagnostics, imaging disease states, and prosthetic limbs. In order to explore a topic of particular interest in more depth, students will also write and orally present a research paper on a topic of their choice.

This course is crosslisted with ENGR2600. Taken under the SCI2260 number, the course satisfies advanced

Biology. If credit is warranted in Engineering, enroll using ENGR2600.

Credits: 4 SCI. Recommended Requisites AP/IB Biology satisfies prerequisite if Olin Foundational Biology has not been taken.. Hours: 3-1-8.

**SCI2299 Special Topics in Biological Sciences**

Special Topics in Biology classes (SCI X299) typically cover a specific topic in Biology and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI.

**SCI2310 Environmental Analysis & Science**

How do we measure what's happening in our environment, what do we do with that information, and why do we care? This hands-on, project-based course will introduce approaches that environmental engineers and scientists use to analyze complex environmental systems in order to effectively design solutions to mitigate pollution. We will spend the semester making deep-dives into air quality and water quality, which are at the heart of the two leading causes of premature death in the world: chronic exposure to air pollution and lack of access to clean water. The class focuses on building hands-on skills with real-world data analysis, field sampling techniques and lab analysis skills through integrated projects like analyzing pollutant concentrations along the Charles River, and the course will incorporate strong communication themes as we work toward presenting our results to several diverse audiences. Throughout the course, we will study pollution in its broader social, political, and economic context, considering the complex motivations for pollution mitigation and the broader implications of water and air treatment processes.

This course is cross-listed with ENGR2810.

Credits: 4 SCI.

**SCI2399 Special Topics in Chemistry**

Special Topics in Chemistry classes (SCI X399) typically cover a specific topic in Chemistry and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI.

**SCI3130 Advanced Classical Mechanics**

Classical mechanics revisited with the use of mathematical formulation that makes the "old and dusty" Newton's laws shine in all their beauty. Using differential equations and linear algebra tools, we will venture to look at things only hinted at in introductory physics: variational principles, the two-body problem, motion in accelerated frames, rigid body dynamics, oscillations, Lagrangian and Hamiltonian mechanics, continuum mechanics, nonlinear dynamics, and chaos.

Credits: 4 SCI. Recommended Requisites SCI1130, MTH2210, MTH2220, or permission of instructor. Hours: 4-0-8.

### **SCI3199 Special Topics in Physics**

Special Topics in Physics classes (SCI X199) typically cover a specific topic in Physics and are intended to enhance and expand the selection of offerings from semester to semester.

Credits: Variable Credits SCI. Prerequisite: ENGR2510.

### **SCI3420 Failure Analysis and Prevention**

In this class, we learn failure analysis by doing failure analysis. By planning and implementing hands-on investigations in a laboratory setting, we will gain practical experience in the analysis of engineered components and systems that fail in expected or unexpected ways. Case study readings and class discussions will help us develop an understanding of technical topics such as failure analysis methodology, fracture classifications and micromechanisms, corrosion and degradation, and materials selection and design decision-making. Self-directed projects will enable skill building in laboratory methods and advanced materials characterization techniques, such as scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), optical microscopy, and fracture surface sample preparation.

We won't stop there. We will broaden our learning by critically analyzing how "engineering" failures intersect issues of economics, policy, regulation, justice, and ethical decision-making in complex systems. We will pay particular attention to the social and environmental consequences of larger systemic failures by examining concrete case studies (e.g., the Flint water crisis, Love Canal, e-waste in Guiyu) as well as more abstract and aspirational models for the future (e.g., material circularity, extended producer responsibility).

Written and oral communication assignments will support development of professional skills in synthesizing laboratory and research data, developing and supporting technical arguments, and contextualizing our findings.

This course is cross-listed with ENGR3820.

Credits: 4 SCI. Hours: 4-0-8. Prerequisite: Prerequisite required of a foundation materials science course..

## **Curricular and Experiential Learning Prototypes**

The process of curriculum innovation at Olin College means that curricular prototypes are ongoing during most academic years. These experiments are courses that serve as designated alternatives for requirements in the curriculum. There may also be prototypes that replace a requirement in the curriculum. A curricular experiment is noted by a course code and number. Unless otherwise specified, each course prototype begins with CIE (Curricular Innovation Experiment), followed by the academic year in which it is offered, e.g. CIE2223. If more than one experiment is running, the course number will end in a letter.

### **Current Prototypes**

In the fall semester of 2020, Olin began a strategic initiative to develop new educational approaches in engineering education to address three interlocking aspirations: 1) to create an education that is accessible and equitable, and moves toward dismantling systemic racism, 2) to create an education that is deeply transformative, that opens doors for students, and helps them grow and realize their potential, and 3) to create an education that has a sustainable business model that responds to financial challenges within higher education. Curricular prototypes developed under this initiative will involve a range of partners, be designed for equity and access, and enable institutional learning to shape Olin's future. Prototypes that award academic credit will be overseen by Olin faculty, enable student degree progression, offer meaningful learning experiences, and align with the Olin Learning Outcomes (p. 19).

## Co-curriculars

Co-curricular offerings are (1) non-credit activities combining fun and intellectual awareness, (2) scheduled for a limited time (e.g., one semester), (3) led by a staff or faculty member or by a student working in concert with a faculty/staff member, and (4) funded by the Student Affairs and Resources office. They differ from curricular offerings in that they are not graded and attendance is not strictly enforced. They differ from extra-curricular activities in that they have an intellectual component, faculty/staff leadership, and limited lifespan.

## Academic Policies and Procedures

---

Olin's official Academic Policies and Procedures are listed here. To access the practical resources needed for administrative tasks such as requesting a transcript, petitioning for a course substitution or cross-registering to another school, please visit the Registrar's Office on the Olin website.

### Academic Integrity

It is expected that students will behave with integrity and according to the Honor Code.

All Olin students agree to follow the Honor Code (Student Handbook). There is a culture of honesty on campus that reaches into the classroom. As a student this means you are responsible for your behavior with regard to class deliverables. If it is unclear if an assignment is meant to be individual or group work, please clarify with our instructor(s). Suspicion of violations of the honor code should be addressed to your instructor(s) and then the Honor Board, if applicable. You may use this form to report a violation or send an email to honorboard.

### Advising and Academic Support Services

#### Academic Advising

Every student at Olin has an advisor who is available to answer questions and offer guidance about a student's progress to graduation, major requirements, course options, and other aspects of academic health and decision-making at Olin.

Advising relationships can have a significant impact on a student's experience. Olin has a network of faculty, staff, students, and alumni who comprise a multi-faceted resource for guidance and support within and outside the classroom.

Students who wish to switch advisors can request to do so by contacting the Assistant Dean of Student Affairs. Any changes to faculty advising assignments will be made at the end or beginning of each semester.

#### Academic Assistance

One of the greatest strengths of our community is in the demonstrated care and effort made to work closely with students who have academic need. Though it may not feel this way, needing academic assistance is very common and is often seen as a positive sign of academic growth and learning. Olin offers multiple options for resources for support and academic assistance. On the part of the student in need, asking for help at the first sign of perceived need is most beneficial. Delay in reaching out tends to have a cumulative effect in courses that are largely project-based where work volume increases quickly and unpredictably. In other words, the sooner the student can reach out and connect with even one resource, the more support we can mobilize to work with that student.

#### Instructors

Students who need further clarification on course requirements and projects should feel empowered to seek assistance from their faculty instructors. Faculty instructors can arrange office hours as needed and can serve as an invaluable source of information as students work on any number of projects and assignments. Faculty can also help a student determine any need for additional resources. For some students, perceived academic need can be stressful, especially if the student does not have a frame of reference for their progress in a class. Your instructor can directly guide and support the student to better understand how individuals are doing.

## Course Assistants (CAs)

Many faculty instructors employ CAs for class. These students have demonstrated strength in understanding course materials and are a vital resource for students with questions. CAs often hold office hours in the residence halls during times that are accessible to classmates. They can provide assistance in large and small group settings as well as on an individual basis.

## Tutors

After working with instructors and CAs for the class, if students are in need of more assistance, they can also request a tutor. Students may do this for many different reasons, including that they feel that individualized attention will be beneficial for their success in a course. Tutors are often nominated by faculty instructors and are employed by the college. Students who feel that individual tutoring would be helpful to them should contact the Assistant Dean of Student Affairs as early in the semester as the need becomes apparent. Since the Student Affairs and Resources (StAR) office employs tutors on an as-requested basis, please allow time to locate and connect tutors and students together.

## ARCs (Academic Resource Co-Designers)

Often, a student's academic need relates more to skills that have nothing to do with understanding the content of a course. ARCs are available as academic resources to students who may need assistance with academic skills such as time management, prioritization, study skills, stress management, etc. ARCs are trained in facilitation and listening skills, academic skills coaching, and peer mentorship. ARCs will be available to meet 1:1 and also as part of a walk-in service called the ARCaId, located in the Library. ARCs may also associate with particular classes as a resource for students, facilitate workshops on timely issues that affect students, and create resources for students to use. To connect with an ARC, please email the Assistant Dean of Student Affairs.

## AP exams and advanced study

Olin College does not accept AP Exam credit for incoming students. Olin College does, however recognize that many students enter Olin with a strong background in various disciplines and works to ensure that all students are challenged by the curriculum.

In exceptional cases in which incoming students have taken college-level courses that are equivalent to required courses at Olin, students may petition the Course Substitution and Transfer Board (CSTB) to substitute a prior course for a relevant course requirement. In such cases, the corresponding distribution requirements remain undiminished.

## Attendance

Students are expected to attend all classes at Olin. Each instructor will establish and publish the class attendance policies for reporting anticipated absences and making up missed work, including lab experiences and project work. If a student requires an extended absence, they (or a designee) should inform the Office of Student Affairs and Resources, their instructors, and their advisor.

## Class standing

Class standing is determined by the number of degree credits a student has earned in relation to the 120 required for graduation. The following table is a breakdown of earned degree credits and their corresponding class year and represents a reasonable expectation of progress toward a degree over four years.

<b>Class</b>	<b>Earned Degree Credits</b>
First-Year	0–30

Sophomore	31–60
Junior	61–90
Senior	> 90

## College withdrawal

### Voluntary withdrawal

Students may wish to leave Olin College prior to completing their degree and can voluntarily withdraw from the College. Such a decision may be difficult to make. We encourage students to discuss the situation with their academic advisor and the Assistant Dean of Student Affairs. Students must request a withdrawal form from the Assistant Dean of Student Affairs. Withdrawing for non medical reasons during a semester will yield a grade of "W" (Withdrawn) on the academic record for all courses enrolled. If Voluntary Withdrawal occurs after the last instructional day of the semester, grades from that semester will appear on the transcript.

Dropping all registered courses does not automatically result in an official withdrawal from the college. Financial Aid recipients who drop all registered courses and/or officially withdraw from the college prior to the 60% point of a semester should note that this action will result in a review of their financial aid eligibility and a possible refund of monies to the Department of Education.

Students should consider whether a leave of absence (LOA) might provide a more suitable means for them to address their needs. Students for whom an LOA is most appropriate should follow the procedures for requesting a Leave. Please refer to the Leave of Absence Policy.

### Medical Withdrawal

Students who need to withdraw from Olin College for medical reasons should request a Withdrawal form from the Assistant Dean of Student Affairs and indicate Medical Withdrawal. Medical documentation may be required to complete the process.

Medical Withdrawals during a semester (by the last instructional day of a semester) will result in deletion of the semester's registration from the student's record. Students may be entitled to a full or partial refund of certain expenses and fees according to the guidelines of the College's Refund Policy. Students who are on a Medical Withdrawal may not return to campus or attend college events (on-campus or off-campus) without written permission of the Dean of Student Affairs. Permission must be requested at least ten business days in advance of the event.

### Required and Administrative Withdrawal

At times, the Dean of Students (or the Dean's designee) may require a student to withdraw from Olin College for academic or any other reasons. Students who are required to withdraw may not return to campus or attend college events (on-campus or off-campus) without written permission of the Dean of Students. Permission must be requested at least ten business days in advance of the event.

### Once a Student is Withdrawn

Once a student withdraws they typically have 48 hours to vacate their residence hall room. Specific arrangements should be made with the Associate Director of Residence Life. Students must return their room key to the Associate Director of Residence Life and leave their room in the condition in which they found it. Students who are Withdrawn may not leave items in College storage unless it is appropriate for the circumstances and individual arrangements are made with the Associate Director of Residence Life.

## Return Following Withdrawal

Each request for readmission after withdrawal (voluntary, medical, required, or administrative) is assessed on its individual merits. As such, readmission requirements will vary. Written approval from the Dean of Students is required for readmission. To request readmission the student must complete the Readmission Form and send it to the Dean of Students no later than 60 days prior to the first day on instruction for the semester in which the student plans to return. The Dean will follow up with any requests for additional information. When considering registration and housing needs, notification is best made in October for spring returns and April for fall returns. Requests to return are considered on a case-by-case basis.

## Course overloads

Olin students may register for a maximum of 20 credits each semester. The maximum load of 20 credits does not include non-degree activities (e.g., passionate pursuits). In exceptional circumstances, students may petition the Committee on Student Academic Performance (COSAP) with the consent of their advisor for approval of a course overload. Additionally, COSAP may reduce the maximum credits allowed. This reflects Olin's commitment to reasonable expectations and academic success. First-year, first-semester students are limited to taking a maximum of 18 credits. Requests for overloads may be sent to COSAP via the Registrar's Office, using registrar@olin.edu.

## Course waivers

**Course Waivers: Students with proficiency in a given academic area may challenge a requirement in that area.**

- A course waiver does not provide credit for a given requirement; rather, it exempts the student from completing that requirement. A sufficient number of credits in the academic area must be taken in place of the requirement. For example, waiving the Arts, Humanities, Social Science (AHS) Foundation requirement will require the student to take 4 credits of AHS in lieu of the foundation.
- To request a waiver, students must complete the Course Waiver Approval Form, including obtaining the signature of a professor who currently or routinely teaches the course for which the waiver is being requested. The professor will decide what evidence is required to prove that the student is eligible for the waiver and review this evidence before signing the form.
- The completed and signed form must then be submitted to the Registrar's office.
- Notation of all waivers will be placed on the student's degree audit and on their transcript.

## Course withdrawal

Students may withdraw from courses up through the last day of instruction in the semester. To withdraw from a course, students need written approval from the instructing faculty member and their advisor. Students must then process the course withdrawal with the Registrar's Office. A grade of Withdrawn (W) will be entered for the course and will not affect the grade point average. Credits attempted will be noted, but course credit will not be earned. Students are responsible for meeting with their advisor to determine how the credits, and/or the requirement will be completed in the future. Olin students cross-registered at one of the BBW schools must follow the academic policy on course withdrawals for the host school.

Course withdrawals for half-semester courses can be done up through the last instructional day of that course.

## Cross-listed courses

Cross-listing is a term associated with two distinct course numbers for a single academic activity. The activity can be defined under two topics depending on what aspect of the course content a student focuses on during their enrollment.

To this end, the student elects the path at the beginning of the course by selecting the appropriate course number. The distinction is important because it could frame your project and impact how your experience works toward completing a requirement.

However, we do recognize that over the course of a semester, your experience may change. If this happens, you may (with approval) change the credit type (MTH, SCI, ENGR, etc) assigned to a cross-listed course. This change is allowed up to a year after the end of the course, and **is at the discretion** of the faculty that offered the course. Students can solicit approval from the instructor, and, if granted, forward that approval to the registrar's office to make the change. If a student disagrees with the instructor's assessment, they can make an appeal to the ARB.

## Cross-registration

Olin has cross-registration agreements with Babson College, Brandeis University and Wellesley College (the BBW schools). These agreements increase the academic offerings available to Olin students.

Olin students, with the exception of first-semester, first-year students, are permitted to enroll for one course each semester at each of the BBW schools, subject to the continuation of the cross-registration agreements.

Cross-registering for a course at a BBW school will count toward a student's total degree credit load at Olin each semester.

Olin students are not permitted to take courses at BBW schools which would substantially duplicate the content of a course or set of courses available at Olin. Students may petition the Course Substitution and Transfer Board (CSTB) for an exception to this rule. Keep in mind that the CSTB reviews cases twice a semester (middle and end).

Deadlines and academic policies for cross-registration follow the rules of the host school. Students are responsible for all deadlines and registration procedures related to the host school, including - but not limited to -pass/fail, drop, add, and withdrawal policies. Students are also responsible for resolving any scheduling conflicts that may arise during a final assessment period.

Grading – Olin will report grades from cross-registration classes as they are reported to us by the host school. If a course normally reports letter grades, students hoping to take the class as Pass/No Credit must follow the rules of the host school to determine if they can be graded on a pass/no credit basis. Olin will not convert a letter grade in a cross-registered class to Pass/No Credit on our records.

Information regarding procedures for cross-registration is provided in the semesters' registration page on the Registrar's website.

NOTE: Due to the variation of grading deadlines at BBW schools, seniors are strongly encouraged not to cross-register during their final semester at Olin.

## Curriculum and Policy Committees

Academic Recommendation Board (ARB)

- Subcommittee: Course Substitution and Transfer Board (CSTB)

Committee on Student Academic Performance (COSAP)

### Academic Recommendation Board (ARB)

The Academic Recommendation Board (ARB) has the responsibility to foster change and act as a steward of the curriculum. Annually, the ARB processes student updates to plans of study (major/concentration). Students may petition the ARB if they need to apply for an exception to graduation requirements and/or academic policy. Petitions should be sent to [arb@lists.olin.edu](mailto:arb@lists.olin.edu) for review.

## Course Substitution and Transfer Board (CSTB)

The Course Substitution and Transfer Board (CSTB) is a subcommittee of the ARB and has the responsibility of awarding Olin credit for classes taken at another institution.

There are three cases where a student can take a class at another institution and get credit toward an Olin degree: cross registration at Babson, Brandeis or Wellesley; classes taken during a Study Away experience; and classes taken at another institution during a summer or before enrolling at Olin (not including dual degree high school programs). For more information on transferring credit, see Transfer Credit section. When considering science courses at other institutions be sure they include a laboratory component and are courses within a science major.

The CSTB also determines what distribution and course requirements a non-Olin course can count for. Many courses at the BBW schools have been pre-approved. Prior to taking a non-Olin class not on the pre-approval list, students should request permission from the CSTB to count this class toward satisfying a distribution or course requirement.

Finding Forms:

- 1) to Substitute a Babson, Brandeis, Wellesley or a different Olin course for a requirement - use a Substitution Form
- 2) to transfer credit to Olin from (study away or other), use a (Pre-Approval) / Transfer Credit Form

## Committee on Student Academic Performance (COSAP)

The Committee on Student Academic Performance (COSAP) is empowered to review, interpret and enforce academic performance policies. At the end of each semester the committee reviews the all student grades in accordance with the academic performance policy, and progress toward the degree. Additionally, the committee acts as an appellate body for students with academic performance grievances.

COSAP reviews student petitions for exceptions to other academic performance policies. The twenty credit maximum course load policy is a typical example of a petition to COSAP. Olin students are only permitted to take **more than 20\* credits** if there are exceptional circumstances. An example of exceptional circumstances include health issues, now resolved, that prevented a student from taking 16 credits/semester previously. Please explain how your situation qualifies as exceptional circumstances on the form. Note: a desire to take more classes is not considered an exceptional circumstance. The form can be found on the FORMS section of the Registrar's website. Petitions should be submitted no later than the last day to add a course

This committee is chaired by the Associate Dean for Academic Programs or designee (non-voting, except in the case of a tie) and consists of the Registrar (non-voting), the Dean of Students, the Assistant Dean of Student Affairs and two faculty members. Students wishing to appeal a decision made by COSAP must submit their appeal to the Registrar within one week of the original decision.

## Declaration of major/change of major

Students are expected to declare their major no later than the time of registration for the fifth semester (during their sophomore year). At this time, there is a *Major Declarathon Event* where curriculum and program advising is available and an introduction to the process is presented. After the advising event, each student receives a survey form that asks about their choice of courses to complete general and major/concentration requirements. These entries are then reviewed by faculty with curricular expertise and the results are sent to the student and their advisor, with a copy retained by the Registrar's Office.

Olin understands that a student's path toward their degree may change and, as a result, during the fifth or sixth semester, there is a *Junior Reality Check*, where students update or change their program, major, and/or concentration plans of study.

Lastly, senior audits take place during a student's final two semesters. Senior audits take many forms and begin via consultation between a student and their advisor. There are also drop in sessions with the Registrar's Office, and opportunities for plan of study updates. The process culminates with degree certification by the Registrar and Faculty.

Note: Students who change their major should be aware of their remaining degree requirements. Additionally, they are responsible for all tuition, room/board and fees for any semesters required **beyond the eight covered by the Olin scholarship.**

## Definition of full-time status

To earn a Bachelor's degree from Olin College, all students are required to be enrolled full-time for 8 semesters. The definition of full-time is a minimum of 12 attempted credits (not including passionate pursuits) each semester with a maximum\* of 20 attempted credits (including passionate pursuits) each semester. Students are expected to follow the curriculum based on their entry year.

Part-time study is generally not available at Olin College; however, special cases will be considered by the Assistant Dean of Student Affairs. Any student in need of more than 8 semesters at Olin must petition with the Dean of Student Affairs.

\*In the first semester, first-year students are limited to attempting a maximum of 18 credits of degree credits. Students wishing to enroll over the maximum may petition the Committee on Student Academic Performance (COSAP) by emailing their petition to [registrar@olin.edu](mailto:registrar@olin.edu).

## Disability-Services

Disability Services at Olin (DSO) is committed to providing equal opportunities and equal access to education programs, and activities for all students with disabilities. We engage in an interactive process with each student and review requests for accommodations on a case-by-case basis. Furthermore, we want to serve as a resource and source of information to all members of the Olin community around access and disability rights. Using a social model of disability, DSO aims to reduce barriers for students with disabilities to access their education.

If you have a documented disability (or think you may have a disability) and would like to register with Disability Services at Olin (DSO), please contact [disability.services@olin.edu](mailto:disability.services@olin.edu)

## Confidentiality Statement

DSO works with students confidentially and does not disclose any medical or disability-related information without their permission. In partnership with faculty and other student services offices, information is shared only on an as-needed basis and in accordance with confidentiality policies and procedures.

## Reasonable accommodations policy

Disability Services at Olin (DSO) collaborates with and empowers individuals who have documented disabilities by working together proactively to determine reasonable and appropriate accommodations in a variety of avenues that impact student life (academic, housing, dietary). We value a community approach to understanding disability as an integral part of diversity and work in collaboration with stakeholders on campus to promote a holistic and informed approach to accessibility.

It is Olin College's policy to comply fully with all state and federal disability laws. Olin does not discriminate against applicants or students with disabilities, and will consider modification to academic programs where necessary to ensure that our requirements are not discriminatory, as long as the modifications do not fundamentally alter the nature of our programs. Student Affairs coordinates services for students with learning disabilities, sensory impairments, psychological disabilities and medical conditions.

### Academic Accommodations

- The ADA does not require colleges or universities to lower academic standards or fundamentally alter the nature of the programs provided. Students with documented disabilities must meet all requirements for graduation. A reasonable accommodation is a modification or adjustment to a course, program, service, activity, or facility that removes an existing barrier to access, so that qualified students with disabilities have equal opportunities to attain the same levels of performance or enjoy equal benefits and privileges as are available to similarly situated students without disabilities. Please note that accommodations are not retroactive.

- Students are responsible for identifying themselves to the Assistant Dean of Student Affairs and providing appropriate documentation of their disability and need for accommodation. Services for students with learning disabilities may include, but are not limited to, academic accommodations, coaching on organizational and time management skills, and academic advising. Services for students with physical, sensory, or psychological impairments as well as medical conditions may include, but are not limited to, academic accommodations, assistance with adaptive technology, accessibility accommodations, and academic advising. Any specific modifications granted will be based on detailed discussions with each student about their particular situation, on information from a medical or health care provider concerning the student's disability and related needs, and on an open dialogue about educational expectations. In other words, disability services is seen as an ongoing conversation that we are always open to having, depending on the student's needs and experiences.

## Service and Emotional Support Animals in Residence

Olin College is committed to providing reasonable accommodations to qualified students with disabilities. While Olin does not permit pets to reside at the college, we do welcome service animals and will work with students to determine if an Emotional Support Animal (ESA) is a reasonable accommodation. The policy below details definitions and explanations for our overall animal policy at Olin.

### Owner Responsibilities and Information

Please note that there are some important legal and community standards that, if are not adhered to, means that the Owner may be required to remove the animal from the premises.

- The assistance animal must be under the owner's control at all times. The Owner must always be in full control of the ESA. The animal must generally be on a leash, harness, or other tether (or in an appropriate crate) unless the Owner's disability prevents its use, or the use of one would interfere with the Service or Assistance Animal's ability to be of service. In its sole discretion, the College may require certain animals to be restrained or crated in some circumstances and will make such determinations on a case-by-case basis and notify the Owner about such requirements.
- The animal should not be disruptive. (For dogs, this includes barking, growling, crying, jumping, and destruction of property). The Owner is responsible for assuring that the Approved Animal does not unduly interfere or adversely affect the routine activities of student housing or other residents.
- The animal must be housebroken. If you are bringing an animal that cannot or does not follow traditional housebreaking practices, you must maintain a designated waste removal area for the animal. We expect proper stewardship of your shared space to ensure the health and safety of all members of the campus community.
- The animal must be reasonably behaved. While an ESA may not have formal training, it is up to the discretion of the Disability Services Office to request training for an animal that does not appear to be reasonably behaved. For dogs, behavior that may result in a request for additional and formal training could include excessive jumping, lunging or pulling at the leash, guarding, growling, playful biting, barking, difficulties being alone in the residence. If the animal poses any sort of threat or danger to any Olin resident, then this would also be grounds for removing the animal from Olin.
- The animal must be safe and cared for. The care and supervision of the Approved Animal is solely the responsibility of the Owner. The Owner is responsible for ensuring the safety of the Approved Animal and the Olin community. The Owner must not have any past or current student conduct issues that may impact the Owner's ability to care for and effectively control an animal. In addition, the Owner must not have a history of abuse or irresponsible behavior related to the Approved Animal or others that negatively impacts the Owner's ability to ensure the safety of the Approved Animal or the Olin community. If Olin determines that such conduct issues are negatively impacting the safety of the Approved Animal or the Olin community, Olin will take appropriate measures, up to and including a determination that the Approved Animal may no longer be permitted on campus.
- The animal must have an up-to-date vaccination record. In accordance with local ordinances and regulations, the ESA must receive all required and/or recommended immunizations against diseases. Dogs must have current vaccination against rabies and wear a rabies vaccination tag. Other types of ESAs must have appropriate and customary vaccinations. Local licensing requirements must be followed. The College may request updated verification regarding an ESA's vaccinations at any time during the animal's residency.

- The animal must be in good health. ESAs must be in good health as documented annually by a licensed veterinarian. Appropriate documentation will be determined on a case-by-case basis but may include a vaccination certificate or veterinarian's statement regarding the animal's health. The College has authority to direct that the ESA receive veterinary attention in appropriate circumstances.
- The animal must be kept clean and live in clean conditions. It is the Owner's responsibility to remove and properly dispose of any waste appropriately (i.e. using a sturdy, sealed plastic bag for waste disposal). The animal must be clean and well groomed, and measures should be taken at all times for flea and odor control. The Owner's residence may be inspected for pests as needed. Facilities or Residence Life staff will schedule any such inspection. If pests are detected upon inspection, the residence room or hall will be treated using fumigation or other methods by a College-approved pest control service. The Owner will be billed for the expense of any pest treatment above and beyond routine pest management in the residence halls. The Owner will be billed for the expense of any pest treatment above and beyond normal required pest management. The Owner will be held responsible for any room damages including the excessive cleaning or replacement of the carpet. This will be noted on the Room Condition form and during the Health and Safety Inspections.
- Owner must report any incidents. In the event of any incident involving property damage or bodily injury by the Approved ESA, the owner is required to submit a written report to the Office of Student Affairs within 24 hours detailing the events of the incident and identifying any other persons involved in the incident or witnessing the incident. The Owner is financially responsible for the Approved Animal, including for any bodily injury or property damage caused by the Approved Animal. The Owner's financial responsibility may include replacement of furniture, carpet, window, wall covering, and costs of damage to other College owned property. The Owner is expected to cover these costs at the time of repair and/or move-out.
- The animal may not be left overnight without the Owner. Approved Animals may not be left overnight in housing without the Owner. Approved Animals must be taken with the Owner if the Owner leaves campus overnight.
- Other conditions or restrictions may apply as needed. The Office of Student Affairs may place other reasonable conditions or restrictions on the Approved Animal depending on the particular facts and circumstances, including the nature and characteristics of the animal.
- Campus operations will remain the same. From time to time, the College may use pesticides, pest control devices, de-icing materials, cleaning supplies, and other materials for the maintenance and operation of housing. The College is not responsible for any harm to Approved Animals caused by such materials.
- All existing housing policies will remain the same. The Owner agrees to continue to abide by all other College policies, including housing policies. Any violation of this policy may result in immediate removal of the Approved Animal from the College. Reported violations will be reviewed by the Assistant Dean of Student Affairs.
- Limited access based on safety may be enforced. The College may prohibit the use of Approved Animals in certain locations due to health or safety hazards, where animals may be endangered, or where their use may compromise the integrity of research or fundamentally alter the nature of a program or activity. The safety of locations will be individually considered by the Assistant Dean of Student Affairs. If a location is determined to be unsafe for the use of a Service Animal, alternative reasonable accommodations will be explored and provided as appropriate to ensure the individual equal access to the activity.

## Legal Considerations

### For Emotional Support Animals (ESAs)

Legal justification for the use of Emotional Support Animals is found in the Fair Housing Act (FHA); it stipulates:

- Persons with disabilities may request reasonable accommodations for any assistance animal, including an emotional support animal, under both the FHA and Section 504.
- An ESA is not a pet. It is an animal that provides the emotional support needed to alleviate one or more identified symptoms or effects of a person's disability or disabilities.

- Disability services providers are to evaluate a request for reasonable accommodations to possess an ESA in a dwelling using the general principles applicable to all reasonable accommodation requests. After receiving such a request, the disability services provider must consider the following:
  - Does the person seeking to use and live with the animal have a disability — i.e., a physical or mental impairment that substantially limits one or more major life activities?
  - Does the person making the request have a disability-related need for an ESA? In other words, does the animal work provide emotional support that alleviates one or more of the identified symptoms or effects of a person's existing disability?

## For Service Dogs

Legal justification for the use of a service dog is found in the Americans with Disabilities Act; it stipulates:

- Service dogs perform many disability-related functions, including but not limited to, guiding individuals who are blind or have low vision, alerting individuals who are deaf or hard of hearing to sounds, providing protection or rescue assistance, pulling a wheelchair, fetching items, alerting persons to impending seizures, or providing emotional support to persons with disabilities who have a disability-related need for such support.
- Service dogs are permitted to enter any area of a facility where the public is permitted to go.
- A person with a disability cannot be asked to remove their service animal from the premises unless: (1) the dog is out of control and the handler does not take effective action to control it or (2) the dog is not housebroken. When there is a legitimate reason to ask that a service animal be removed, staff must offer the person with the disability the opportunity to obtain goods or services without the animal's presence.
- When it is not obvious what service an animal provides, only limited inquiries are allowed. Staff may ask two questions: (1) is the dog a service animal required because of a disability, and (2) what work or task has the dog been trained to perform. Staff cannot ask about the person's disability, require medical documentation, require a special identification card or training documentation for the dog, or ask that the dog demonstrate its ability to perform the work or task.
- Allergies and fear of dogs are not valid reasons for denying access or refusing service to people using service animals. When a person who is allergic to dog dander and a person who uses a service animal must spend time in the same room or facility, for example, in a school classroom, they both should be accommodated by assigning them, if possible, to different locations within the room or different rooms in the facility.

## Application and Approval Process for the use of an ESA

Students with disabilities who require the use of Emotional Support Animals (ESAs) as a reasonable accommodation may be permitted to bring such animals on campus provided that they comply with the College's policies regarding such animals.

Students who seek to bring an ESA to campus must email Disability Services at Olin (DSO) at [disability.services@olin.edu](mailto:disability.services@olin.edu). This is an interactive process where every situation is considered on a case-by-case basis.

Please note:

- Approval for an ESA is not automatic. The staff will determine, on a case-by-case basis, and in collaboration with other offices on campus if necessary, whether to approve the student's request for an ESA.
- In making this determination, Student Affairs and Resources (StAR) will consider the needs of the student and consider whether this request will have a direct impact on removing barriers to accessing their education.

The animal must not be in residence prior to approval by the Office of Student Affairs. The approval of a request is animal-specific and is not transferable to another animal. ESAs are not allowed in public areas (except outdoor public areas) except to enter or exit the building. ***ESAs are not permitted in any campus buildings or indoor public areas outside of their direct residence.***

A resident student seeking to keep an ESA in housing must make a formal request to the Disability Services Office at Olin. Any approval under this policy is valid for one academic year. For the initial request, the student will fill in the ESA Request Form that they receive from DSO and documentation is required. Upon review each year, if the continued need for an ESA is not readily apparent, the College reserves the right to request additional clarification and medical documentation from a physician, psychiatrist, social worker, or other mental health professional, including (i) verification of the student's disability, (ii) statement on how the animal serves as an accommodation for the documented disability, and (iii) statement on how the need for the ESA relates to the ability of the student to use and gain benefit from College housing.

Any necessary documentation must be dated within the last 12 months.

After receiving completed documentation for the application for an ESA, Disability Service Office staff will arrange a meeting with the requesting student. This policy will be reviewed with the resident student at that time.

## Notification and Appeal Rights for Approved Animals

***For ESAs only:*** Once the Owner makes the official request, provides documentation, and has spoken with DSO staff about their need, the DSO staff will review all of the submitted documents, along with the Owner's agreement to all conditions and responsibilities of ownership. If the request for an ESA is approved, the College will notify the Owner.

If a request is denied, the requesting student may appeal a denial of a request for an ESA within five business days to the Dean of Student Affairs. The decision of the Dean of Student Affairs is final.

***For all Approved Animals:*** Student Affairs staff will make a reasonable effort to notify the other residents in the housing where the animal will be located. This notice will be limited to information about the animal's presence as an accommodation to a student with a disability: there will be no disclosure of the student's disability. Other resident students with medical condition(s) who are affected by animals (e.g., respiratory diseases, asthma, severe allergies) are asked to contact Disability Services at Olin if they have a health or safety related concern about exposure to an Assistance Animal. Such affected students may be eligible for disability accommodations when living in proximity to a Service or Assistance Animal. The Office of Student Affairs staff will collaborate, as necessary, to resolve conflicts related to an Assistance Animal. Staff members will consider the needs and/or accommodations of all resident students involved.

All roommates or suitemates of the Owner must sign an agreement acknowledging that the Service or Assistance Animal will be in residence with them. If one or more roommates or suitemates do not approve, the non-approving roommates or suitemates, may be moved to a different location.

## Revocation of Approval for ESAs

The College will take appropriate measures, up to and including revocation of approval for an ESA if, among other reasons:

- The Owner violates any term of this policy, after notice and reasonable opportunity to remediate the violation(s) when possible
- The ESA is no longer needed to assist with a disability or is no longer deemed a reasonable accommodation
- The College determines that the Approved Animal threatens the health, safety, or property of anyone in the Olin community, or that the Approved Animal is adversely affecting Olin's programs and activities; or
- The College discovers that false or misleading information was provided in the Owner's application for approval of an Assistance Animal.

The College reserves the right to make interim accommodations while determining appropriate measures.

The requesting student may appeal revocation of approval of an ESA within five business days of the notice of revocation to the Dean of Student Affairs. The decision of the Dean of Student Affairs is final.

The Owner must notify the Office of Student Affairs in writing if the Approved Animal is no longer needed or is no longer in residence. To replace an Approved Animal, the Owner must file a new Housing Accommodation Request Form.

### Requirements for Faculty, Staff, Students, Guests, and Other Members of the College Community

It is the responsibility of the Owner to ensure that community members are aware of and abide by the following practices:

1. They are not to touch or pet an Approved Animal unless invited to do so.
3. They are not to feed an Approved Animal.
4. They are not to startle an Approved Animal.
5. They are not to separate or to attempt to separate an Owner from their Approved Animal.
6. They are not to inquire for details about the Owner's disabilities. The nature of a person's disability is a private matter.

### Definitions

**Emotional Support Animals (ESAs)** are animals that perform tasks and/or provide service, assistance, or emotional support *which alleviates one or more identified symptoms or effects of an individual's disability*. Some, but not all, animals that assist persons with disabilities are professionally trained. Other Assistance Animals are trained by the owners. In some cases, no special training is required. The question is whether or not the animal performs the assistance or provides the benefit needed as reasonable accommodation by the person with the disability. Dangerous, poisonous, and illegal animals are not permitted as Assistance Animals.

**Approved animals or assistance animals** are animals that are permitted in Olin College student housing. This can include Emotional Support Animals and service animals. Different laws and regulations govern the use of an ESA versus a service animal.

A **pet** is an animal kept for ordinary use and companionship. A pet is not considered an approved animal. Students are not permitted to keep or bring pets in student housing. Furthermore, if an animal provides comfort to their owners, but do not provide a direct benefit for a disability-related need, they are still considered pets and are not permitted on campus.

The **owner** is the resident student who has received written permission from the College to keep an Approved Animal in student housing under this policy.

A **service animal** is a dog who is trained to do work or perform tasks for an individual with a disability. These dogs are trained in certain tasks or work that directly relates to their owner's disability. Under certain, restricted circumstances, a miniature horse can also function as a service animal.

### Excused Absences for Final Assessments

Students who are unable to take their final assessment (including, but not limited to, written or oral exam, project, presentation, written report/paper) for legitimate reasons and wish to request a make-up generally must obtain advance authorization from the instructing faculty members and Student Affairs. In the event that advance authorization cannot be obtained due to extenuating circumstances, students should contact Student Affairs and the instructor(s) as soon as they are able.

If the assessment is not completed prior to the end of the grading period, a grade of I, Incomplete, will be recorded on the student record. An incomplete grade is a temporary grade that does not affect a grade point average.

## Extra help

Extra Help is available for all courses. Resources for help include, but are not limited to, instructors, course assistants (CAs), Academic Resource Co-Designers (ARCs), peer tutors, and individual tutors. Individual tutors are assigned by Student Affairs and Resources.

## Grade changes

### Dispute of a grade

Students wishing to dispute a grade should first have a discussion with the instructing faculty member. If the student and faculty are in disagreement after the discussion, the student may appeal to the Dean of Faculty. The Provost / Dean of Faculty will meet with the student within 14 days of the appeal and will solicit a statement from the faculty member. Following this process, the Dean of Faculty will review the case and submit a recommendation to the faculty member. The faculty member will then make a final decision, in consultation with the Provost / Dean of Faculty. After one calendar year (from the end of the original grading period), all grades are final.

## Grading at Olin

### Grading rules and regulations

Standards-based grading: Course grading at Olin will be based on student progress toward defined course goals. Summary metrics (e.g., GPA) will be provided on the student's transcript, but relative summary metrics (e.g., class rank) are neither published nor tabulated.

1. Privacy: Olin will not publicly post either grades or summary metrics (e.g., GPAs) in any form that allows identification of any particular individual's performance. It is expected that students will respect the privacy of each other's grades.
2. Grading clarity requirements: On the first day of instruction, each Olin class will publish the following information:
  - a. Learning objectives that specify the knowledge, skills and attitudes that students are expected to develop or attain in the class. The learning objectives should be an effective instrument for students to understand what they will learn and how their learning will be evaluated.
  - b. Grading criteria that specify how the final course grade is determined. Some aspects of grading are necessarily based on the professional judgment of instructors, informed by their experience, and are subjective.
  - c. Feedback: Olin expects instructors to provide students with feedback on their performance. If an instructor feels a student will not pass a course, or if the instructor is otherwise concerned about a student's performance, the instructor will issue a notice, called a R.O.U.K., in a timely manner. Copies of this notice will be sent to the student, the student's faculty advisor and the Assistant Dean of Student Affairs. If a course is offered as year-long and utilizes a first semester TBG grade option, the course instructor will issue an end-of-semester notice of concern for any student not making satisfactory progress in the first half of the course. This end-of-semester notice will be considered a deficiency in the student's overall semester progress and the student will be reviewed at the end of the fall semester Academic Progress meeting of COSAP.
3. End of semester feedback to the advisor: Olin advisors have real-time access to advisees' course grades through the Student Information System. In addition, instructors will notify advisors of any significant concerns noted during the semester.
4. Pass/No Record first semester: In the first semester of the first year, students receive only a grade of Pass (P) or No Record (NR). A grade of No Record does not affect the student's GPA and does not appear on the student's official transcript. A student who receives a grade of NR cannot use the class to satisfy a course requirement or use it as a prerequisite. Courses where an NR is earned require a repeated attempt at the student's earliest convenience. All repeated attempts of first year, first semester courses at Olin will be graded as pass/no credit and the assessment earned will appear on the transcript, yet will not impact the student's GPA.

5. Course grades: Course grades at Olin provide students, their advisors, potential employers and graduate schools information about overall performance. Course grades are determined based upon a mix of demonstrated comprehension, skill, participation and effort.
6. Grading scale: The Olin College grading scheme contains letter grades with a resulting grade point average (GPA) on a four-point scale. Students will be assessed using the following interpretation:

<b>Grade</b>	<b>Assessment Description</b>	<b>Point Value</b>
A	Excellent	4.0
A-		3.7
B+		3.3
B	Good	3.0
B-		2.7
C+		2.3
C	Fair	2.0
C-		1.7
CR	Credit (for non-degree course activity)	n/a
D+		1.3
D	Poor	1.0
EG	Experimental Grading	n/a
F	Failing	0.0
I	Incomplete	n/a
IF	Incomplete Failing	0.0
IL	Incomplete/Leave of Absence (temporary grade)	n/a
IP	In Progress (temporary grade)	n/a
L/NR	Leave/No Record	n/a
MET	Objectives of the course have been MET	n/a
NC	No Credit for Pass/No Credit Option	n/a
NCR	No Credit (for non-degree course activity)	n/a
NG	No Grade Reported by Instructor (temporary grade)	n/a
NPP	No Passionate Pursuit Recognition (internal designation)	n/a
NR	No Record	n/a
P	Pass	n/a

PP	Passionate Pursuit Recognition	n/a
R	Course Repeated	n/a
TBG	To Be Graded (represents first semester placeholder for required yearlong courses)	n/a *
TR	Transfer Credit	n/a
UNM	Objectives of the course are UNMET	n/a
W	Withdrew from Course	n/a

*\*see item 3 related to notice of academic concern for academic progress standings*

7. Experimental grading: The 'EG' grade represents an "Experimental Grade" designation, implemented in a small number of courses during a curricular experiment that began in 2009. Each student may undertake no more than one "EG" course per semester. An 'EG' grade in a student's transcript indicates that a student completed the course's learning objectives and received instructor feedback based upon criteria that do not have direct mapping onto the ABCDF grading system. Students who do not complete the learning objectives will receive a "no credit" designation on their transcript (similar to the "no credit" option for pass/no credit courses).
8. Repeated courses: If a student retakes a course at Olin the original grade will remain, but will not be factored into the student's GPA. The new grade will appear on the transcript in the semester in which the course was retaken. There is no guarantee that any course will be offered for a student to repeat, as in the case of, but not limited to, Special Topics courses. For courses in the first year, first semester that require repeat see item #4 above. Repeated courses may be used in Financial Aid Satisfactory Academic Progress Pace of Progression calculations.
9. Minimally sufficient grades: A grade of D, EG, or Pass is sufficient to earn credit for a course. A grade of D or EG is sufficient to satisfy a course requirement. A grade of C-, EG, or Pass is sufficient to satisfy a prerequisite requirement.
10. Pass/No Credit: Up to 12 credits of a student's distribution requirements may be satisfied by taking classes that are usually offered for grades as Pass/No Credit. In such cases, a Pass is given for performance equivalent to a grade of C- or higher. Courses taken Pass/No Credit may not be used to meet course requirements unless the course is not offered for grades or is taken in the first semester of the first year. Courses that are only offered Pass/No Credit, Independent Study and Research do not count toward the 12 credit limit. Students must declare their Pass/No Credit grading option by the drop date of each semester. The Pass/No Credit option does not impact the GPA; either Pass or No Credit will appear on the transcript. Once a student decides to take a course Pass/No Credit, they cannot revert back to receive a letter grade.
11. Passionate Pursuits: Passionate Pursuits are non-degree credit, and will be listed on the transcript if the nature of the activity and the level of completion are sufficient to merit credit.
12. The Olin transcript: A student's academic transcript at Olin includes the following information:
  - a. A list of classes the student took in each semester, and a record of the student's final grades in those classes. First-semester first-year transcripts will show only classes that were passed. Classes taken Pass/No Credit after the first year appear either as a Pass or as a No Credit.
  - b. The student's GPA.
  - c. A list of non-degree activities taken each semester with a cumulative total of credits earned. There are no grades associated with non-degree activities.
  - d. Co-Curricular offerings in which the sponsoring staff or faculty member reported sufficient student participation for a transcript notation.
13. Grading and credits of cross-registered courses: Olin students who cross-register for a course at Babson, Brandeis, or Wellesley will receive credit for the course if they receive a passing grade. All grades will be recorded on their transcript and be factored into their grade point average. Credits from these schools will be counted on a one for one basis at Olin. For example, if a three credit course is taken at Babson, it will count as three Olin credits. A one unit Brandeis or Wellesley course is equal to four Olin credits. Courses that use other accounting schemes may be translated into equivalent Olin credits rounded to the closest integer.

14. Circumstantial grading: is used in a semester of extraordinary disruption (e.g., pandemic), and is authorized by a faculty vote or by the Provost/Dean of Faculty when a quorum of the faculty cannot be met. A grade of MET satisfies course, distribution, and prerequisite requirements. A grade of UNM (unmet) does not satisfy course, distribution, and prerequisite requirements.

## Graduation

### **Petition survey**

Students expecting to complete their degrees or walk in Olin's May commencement ceremony must complete an on-line petition survey. This survey indicates the students' intent to complete their Olin degree and initiates the final degree audit process. This survey is typically available six months prior to commencement.

### **Graduation walk policy**

Degree candidates are allowed to walk in one ceremony for their degree. Students who are off sequence may walk with the class with which they entered or with their actual degree year class. If the choice is to walk with the entry year class, the student must file a degree plan for completion of the degree by March 1st of the walk year and must be within 16 credits of completing said degree.

### **Conferral dates**

Olin College confers degrees yearly each May and has only one ceremony per year.

### **Completion date**

When a student completes their degree requirements at the conclusion of the fall semester, their record will be marked as complete with a degree pending. The student must apply for their degree conferral in the following May ceremony. Their record will then be updated to graduate following the May date.

### **Student right-to-know act: Retention and graduation rates**

Under the Student Right-to-Know Act, educational institutions are required to disclose to current and prospective students their retention and graduation rates. The calculations below are in accordance with the formulas and definitions of the United States Department of Education.

The retention of first-time, first-year students who return in the following fall semester is 96% for the 2023 cohort of new students.

The graduation rate is defined as the percentage of first-time students who complete their degree program within 150 percent of the normal completion time for that degree (six years for an Olin bachelor degree). For the 2019 entering class, the graduate rate is 94%.

Additional information is available from the Office of Institutional Research & Decision Support.

## Half-semester courses

The Add, Drop and Course Withdrawal periods are prorated for half semester courses. The Add Period is the first 5 days of the session. The Drop Period is 10 days prior to the last day of instruction for that session. Course withdrawals can be done up through the last instructional day of the half-semester course.

## Incomplete Policy

In the event that a student experiences an acute circumstance that prohibits them from participating in a portion of a course or courses, they can request an incomplete grade to have extra time to make up their missed work. In other words, an incomplete grade is generally approved only when some specific event or illness prevents the student from completing a specific part of the course (such as completing a paper, project or exam). Should the option of an incomplete grade emerge, students and instructors are strongly encouraged to contact the Assistant Dean of Student Affairs to discuss the viability and appropriateness of an incomplete, since discussion is necessary before issuing this grade option. An incomplete cannot be approved in instances where a student is demonstrating an overall difficulty covering or understanding the course materials and appears to need more time or additional instruction to learn the material. If such general difficulty occurs the student should discuss available options with his or her course instructor and advisor well before the end of the semester.

A student may request an incomplete ("I") grade by petitioning the Assistant Dean of Student Affairs. The **deadline** to request an incomplete is the **last day of classes**, unless the acute circumstance occurs during finals week, in which case an exception could be made. If an incomplete grade is approved, the student will be granted an extension period to complete the coursework. The Assistant Dean of Student Affairs, in consultation with others as appropriate, will determine the period of the extension with the instructor and student. In no circumstances may the extension be later than the end of the subsequent semester.

A grade of "I" will be listed as a temporary grade and will not affect the grade point average. If the work is not completed by the approved deadline, the incomplete grade of "I" will be changed to "IF", Incomplete Failing, or an alternate grade upon approval of the instructor. Note: an "IF" grade **does affect** the grade point average.

In some cases a student may need to leave during the semester for a medical reason but, given the timing of the request and the type of work that needs to be completed, the student may be able to complete the work for the semester away from Olin. If that is the case and the need occurs after the 33<sup>rd</sup> day of instruction, a student can request a Medical Incomplete ("MI") for each course. An agreement would need to be reached between the student and each individual faculty member, and may not be possible for all courses in which the student is enrolled, which may result in withdrawal from some courses. A Medical Incomplete must be requested prior to the last day of instruction for the semester and may not be requested after that point. A student taking a Medical Incomplete must inform the Assistant Dean of Student Affairs about their intention to complete the work or take a Medical Withdrawal by the last day of instruction for the semester. If the student does not inform the Assistant Dean of their plans then their status will be changed to Medical Withdrawal.

## Leave of absence (LOA)

Students in good academic standing may request a leave of absence (LOA) for up to 180 days in any 12-month period. To initiate a leave of absence, students should meet with their advisor and request a leave of absence form from the Assistant Dean of Student Affairs. Documentation of the reason for the leave of absence (medical or otherwise) may accompany the request for a leave, if requested. The request, if approved, and any accompanying documentation will be forwarded to the Registrar for processing and placed in the student's academic file. Students may not transfer credits to Olin that are earned during a leave of absence.

When an LOA is approved, student status will be noted as "On Leave." If a leave is not approved, students have the right to appeal the decision to the Dean of Student Affairs within two weeks of the date of the denial of leave. There are two kinds of leaves:

- A leave of absence mid-semester: This type of leave is requested when a semester is in active session\*. In this case, all courses for which the student is registered will be temporarily designated as Incomplete/ Leave of Absence (IL). Any course that is not subsequently completed will then be changed to a grade of Leave/No Record (L/NR) and will be recorded internally for that course. Incomplete/Leave of Absence and Leave/No Record grades do not affect the student's grade point average. The effective date of this leave is the approval date of the leave. Incomplete/Leave of Absence grades must be completed no later than 90 days after the student's return date, or at another date determined by the faculty member and advisor.

*\*This active session does not include the study or final exam period. If a student has an unexpected event that impacts his or her ability to take a final exam, he or she should refer to the Excused Absences for Final Assessments policy.*

- A leave of absence between semesters: This type of a leave is requested for a future semester when there is a circumstance that impacts the student's ability to continue in sequence. In this type of leave, there are no grade entries made. The student's schedule for the ensuing semester will be deleted. The student will be placed on leave effective the first day of the upcoming semester for up to 180 days in any 12-month period.
- If a student does not return from a leave of absence or extends beyond the maximum 180 days in any 12-month period, the student will be withdrawn from the college back to the original date of the leave. All Incomplete/Leave of Absence grades will be changed to Leave/No Record. NOTE: this applies to both types of leaves.

### Returning from a Leave

All students taking an LOA are expected to return in the semester following the leave. Therefore, they will be given a registration time and should contact Housing no later than 30 days before the start of a return semester. When considering housing needs, notification is best made in October for spring returns and April for fall returns.

## Registration

Prior to each semester, there will be a designated registration period in which students will speak with their advisors and make choices on course selection. Advising is a key component to course selection. Each semester, student's are required to be enrolled in a minimum of 12 credits, of which, the minimum 12 are required for degree completion. Any credits beyond the minimum 12 may be used for exploration in areas beyond requirements.

Registration is done on-line. Instructions are available each semester in the published registration booklets. NOTE: Courses available at the time of registration may be subject to cancellation based on enrollment.

## Remote Learning

### Technology Requirements

Olin has a responsibility to verify that students enrolled in Olin courses are able to access their educational program. This includes ensuring that students have adequate technology for access. Therefore, students are required to have regular access to an adequate computer (minimum for video is operating camera and audio/speakers/microphone/headphones appropriate for group video engagement) and internet (at least 1 megabit/second upload and 1 megabit/second download bandwidth, per person, and <500ms network latency). For computational coursework (including SolidWorks), a computer with a Windows 10 system, <5 years old, with Intel i7 dual-core 2ghz+ processor, discrete graphics, 8 gig RAM, and solid state hard drive are adequate. Olin student laptops, purchased Fall 2018 and later, meet this requirement. The Olin campus internet meets the internet requirement. The IT Wiki has more information on testing and maximizing internet connectivity.

### Student Complaint Procedure for Online Learning

Student Complaint Process related to Distance Education and/or On-Line Learning:

Students with any concerns that they believe can be addressed by the Olin administration should request support through the Provost's Office, using this [form](#). The Provost will route concerns to the appropriate internal processes.

While students are requested to seek resolution through Olin's processes first, a student who has exhausted these processes without receiving adequate resolution may file a complaint with the Massachusetts Department of Higher Education (MDHE) following the MDHE consumer complaint process.

Beginning in 2021, Olin is now approved to offer distance education under the authorization from the National Council for State Authorization Reciprocity Agreements (NC-SARA). For student complaints concerning distance education, if unsatisfied after pursuing remedy through Olin's processes (above), distance education students may pursue a complaint with the MDHE. Students located in Massachusetts, or in non-SARA member states and territories (e.g., California) should use the MDHE consumer complaint form, while those located in SARA member states and territories should use the MDHE SARA complaint form.

[MDHE consumer complaint form] <https://www.mass.edu/forstufam/complaints/complaintform.asp>

[MDHE SARA complaint form] <https://www.mass.edu/foradmin/sara/complaints.asp>

## Student academic performance

The Committee on Student Academic Performance uses the following guidelines in determining the academic status of students. Students not in Good Academic Standing will be placed on probation. Students not in Good Academic Standing for two consecutive semesters will be reviewed by the committee and may be required to withdraw. The committee may consider extenuating circumstances in applying these general guidelines. NOTE: In accordance with federal regulations of Title IV Financial Aid Program Integrity Standards, the Financial Aid Office will review academic performance in accordance with the performance measures listed below and will include an overall pace of progression standard. See the financial aid section for more information.

### Qualitative measure of academic performance

Student's first semester: Good Academic Standing is defined as receiving Pass grades in all courses by the start of the second semester.

Subsequent semesters: Good Academic Standing is defined as having a minimum cumulative grade point average of 2.00 by the end of the semester.

During times when circumstantial grading is in play (see Grading at Olin), the qualitative measure will be amended to mirror the binary standard of circumstantial grading (met/unmet). Good Academic Standing is defined as receiving all MET grades (or a minimum grade of C in any session I course) for the semester. Students who do not meet 'good academic standing' may be placed on academic probation.

### Quantitative measure of academic performance

In order to complete the degree in four years (eight semesters), each student will normally take 16 credits (four courses) per semester. Olin College expects students to make reasonable progress toward their degree each semester. As a result, to remain in good standing a student must complete a minimum of 12 degree credits each semester. The Committee on Student Academic Performance will review this quantitative measure in addition to the qualitative measure of a minimum grade point average.

During times when circumstantial grading is in play (see Grading at Olin), the quantitative measure will remain unchanged, e.g. students must continue to earn a minimum of 12 credits in the semester to remain in good standing. Students who do not meet 'good academic standing' may be placed on academic probation.

### Academic readmission

In making decisions on readmission petitions, the Committee on Student Academic Performance (COSAP) will expect the former student to produce timely evidence of good academic performance in college courses comparable to Olin courses, employment and/or community service references and a formal statement explaining changes that will contribute to their academic success at Olin. Credit for courses taken elsewhere while a student is withdrawn from Olin may be eligible for transfer to Olin.

## The add period

During the first 10 instructional days of a semester, students may alter their schedules by adding and/or dropping a course on-line using my.olin.edu. Discussions between students and their advisors are strongly recommended. Students are responsible for submitting their request no later than the 10th class day. Courses cannot be added after the 10th class day. Special circumstances may be granted for BBW sponsored courses when there is a variation in the academic calendars.

Half semester courses have a prorated Add Period. It is the first five days of the session. Note: Independent Study and Research are available for a full-semester only and cannot be added in a second session.

## The drop period

After the Add Period, students may decide to drop a course from their schedule without penalty as long as they maintain a minimum of 12 degree credits. The drop date is the 45th instructional day of the semester. Course drops can be done on my.o.lin.edu during the add period. After the add period period, requests for drops must be made through the Registrar's office and require the instructor and advisor signatures. It is strongly recommended that the student notify the faculty teaching the course.

For half semester courses, the Drop Period is 10 days prior to the last day of instruction for that session.

## Transfer credit

Olin College generally does not accept transfer credit for incoming students. The Course Substitution and Transfer Board (CSTB) may grant exceptions on a case-by-case basis for incoming students who have demonstrated strong performance in rigorous courses taken at accredited institutions of higher education. Under no circumstance will Olin accept courses for transfer that were part of a high school dual credit program with colleges/universities.

Enrolled students wishing to take a course at another college and transfer the credits to Olin must obtain prior approval from the CSTB. A student will need to provide detailed information about the school and the course including, but not limited to, a course description and syllabus. Minimal conditions to determine appropriate schools and courses are 1) the institution must be accredited, and 2) the institution should offer, at minimum, Bachelor degree programs (note: community college systems with articulation agreements to a university or college bachelor's degree may also be considered). Additionally, if the Olin course requirement includes a lab, studio, project and/or shop component, the course at the host school must also include similar experiences to be eligible for transfer. On-line courses may be accepted provided that items 1 and 2 above are fulfilled. Enrolled students considering transferring Olin foundation science courses must show evidence of significant laboratory experience along with relevant content.

The CSTB will ask appropriate faculty to review the course materials before granting approval. If approved, the CSTB will notify the student in writing. Once the course is completed, it is the student's responsibility to have an official transcript sent to Olin College. Provided the student meets the minimum grade (C or equivalent) requirement for transfer, the course and the credits will appear on the student's Olin transcript; the grade does not appear. To ensure standard equivalencies for transfer, the course must be taken for a letter grade or equivalent. Pass/fail grading does not transfer to Olin. In order to receive a degree from Olin, matriculated students must earn at least 60 of their credits from Olin or BBW courses.

Approved coursework will appear on student transcripts with the name of the institution issuing the academic credit, the course title and the credits earned (in equivalence to the Olin semester credit hour). These credits are included in the cumulative earned hours total. NOTE: The pace of progression calculation for financial aid satisfactory academic progress uses credits taken away in both attempted and earned categories. See the Student rights and responsibilities for more details on financial aid satisfactory academic progress.



## Index

4+1 Bachelor of Science Degree with Wellesley College	36
ABET accreditation	6
Academic Integrity	84
Academic Policies and Procedures	84
Academic Programs	25
Academic Recommendation Board (ARB)	88
Accreditation	6
Administration	8
Admission to Olin	16
ADMN - Olin Administration	43
Advising and Academic Support Services	84
AHSE - Arts, Humanities, Social Science, and Entrepreneurship	43
AP exams and advanced study	85
Application and Approval Process for the use of an ESA	93
Attendance	85
Board of Trustees	7
Catalog 2025-26	3
Catalog as a contract and right to modify	6
Class standing	85
Co-curriculars	83
College withdrawal	86
Committee on Student Academic Performance (COSAP)	89
Costs and Financial Aid	16
Course overloads	87
Course Substitution and Transfer Board (CSTB)	89
Course waivers	87
Course withdrawal	87
Courses, Credits, Hours	42
Cross-listed courses	87
Cross-registration	88
Curricular and Experiential Learning Prototypes	82
Curriculum and Policy Committees	88
Curriculum, Goals and Outcomes	18
Declaration of major/change of major	89
Definition of full-time status	90
Definitions	95
Disability-Services	90
Electrical and Computer Engineering (ECE)	25
Engineering	26
ENGR - Engineering	52
Equal Employment Opportunity Policy and Non- discrimination Policy	15
Excused Absences for Final Assessments	95
Extra help	96
Faculty	10
Family Educational Rights and Privacy Act (FERPA)	14
Federal Compliance Statements	14
For Babson, Brandeis and Wellesley Students Engineering Certificate Program	39
General Distribution and Course Requirements	21
Grade changes	96
Grading at Olin	96
Graduation	99
Graduation Requirements	21
Grand Challenges Scholars Program	36
Half-semester courses	99
History	4
Incomplete Policy	100
Independent study and research	34
Information about Olin	4
Intellectual Property	5
Leave of absence (LOA)	100
Legal Considerations	92
Mechanical Engineering (ME)	33
MTH - Mathematics	71
NECHE accreditation	6
OFYI - Olin First Year Introduction	74
Olin College Core Institutional Values	5
Olin College Core Personal Values	5
Olin College Mission Statement	5
Olin College statement of identity	4
Other Academic Programs and Opportunities	34
Overview	18
Owner Responsibilities and Information	91
Passionate pursuits	36
Program Educational Objective	19
Programs of Study and Degree Requirements	18
Reasonable accommodations policy	90
Registration	101
Remote Learning	101
Requirements for Faculty, Staff, Students, Guests, and Other Members of the College Community	95
Research Thesis	35
SCI - Science	75
Service and Emotional Support Animals in Residence	91
Student academic performance	102
Student Complaint Procedure for Online Learning	101
Student Learning Outcomes	19
Student led courses	36
Study away program	34
Technology Requirements	101
The add period	102

The drop period..... 103  
Time limit on degree requirements ..... 7

Transfer credit..... 103

