2012-13 Course Catalog Archive

PROGRAM DESCRIPTIONS

Objectives, Pedagogy and Curriculum

Introduction

Engineering education at Olin is in the liberal arts tradition, with a strong emphasis on the Arts, Humanities, Social Sciences, and Entrepreneurship. Olin is committed to preparing 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. Olin College endeavors to provide its education at little cost to the student. Olin College strives to foster in students:

• a deep appreciation and comprehension of the principles of engineering analysis and design;

• a broad knowledge of social and humanistic contexts;

• the ability to identify opportunities, articulate a vision, and see it to fruition; and

• dedication to intellectual vitality, community involvement and lifelong personal growth.

Objectives

Olin's educational program helps students become individuals who:

1. Can make a positive difference within their profession and their community.

2. Demonstrate technical competence and creative problem-solving skills that foster success in a variety of postgraduate environments, including professional practice and graduate school.

3. Are prepared for and capable of appropriate response to social, technical and global changes.

We hope that, after graduation, our students will increasingly demonstrate achievement of these objectives as follows:

1. They will demonstrate the ability to recognize opportunity and to take initiative. They will be able to communicate effectively and to collaborate well with others. They will understand the broad social, economic and ethical implications of their work, and will be cognizant of their professional responsibilities.

2. They will have a solid grounding in fundamental principles of science and engineering and the ability to apply this knowledge to the design, analysis, and diagnosis of engineering systems. They

will be able to develop creative design solutions that are responsive to technical, social, economic and other realistic considerations.

3. They will demonstrate the results of a broad education that spans math, science, engineering, the arts, humanities, social sciences, and entrepreneurship. They will build on this foundation throughout their careers by engaging in independent learning in order to identify and respond to emerging technical and social developments.

Pedagogy

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

Hands-On Learning

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

Open-Ended Project-Based Learning

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

Multidisciplinary Learning

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

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

In addition to the OIE, Olin builds multidisciplinary connections through tightly coupled, faculty team taught courses such as the Paul Revere: Tough as Nails course block that links history of technology with materials science. Many other courses feature teaching or visits from faculty members who share different perspectives and thereby help students understand the broader context and implications of their work.

Competency Assessment

In addition to course-based graduation requirements, Olin develops and assesses student growth in a number of overarching competency areas. Through Olin's competency learning and assessment system, students demonstrate skill in essential areas such as communication, qualitative understanding and quantitative analysis, teamwork, contextual thinking, opportunity assessment, diagnosis, design, and life-long learning.

Feedback

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

Individualized and Student-Designed Options

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

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

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

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

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

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

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

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

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

Curriculum

The Olin College curriculum provides a strong foundation in engineering, mathematics, and applied science subjects and promotes development of engineering analysis, diagnosis, modeling, and problem-solving skills.

Engineering

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

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

Math and Science

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

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

Design

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

Arts, Humanities, and Social Sciences (AHS)

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

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

Entrepreneurship

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

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

Many students will also explore entrepreneurship and develop opportunity assessment abilities through their Engineering Capstone experience and out-of-class activities such as student clubs, community service, and Passionate Pursuits. The Entrepreneurship experience can culminate in an Entrepreneurship Capstone, requiring students to integrate acquired skills and knowledge. Through a special arrangement with the Babson College Graduate School, Olin students have the opportunity for a “fast track” to a Master’s Degree in Management with a specialization in Technical Entrepreneurship.

Communication

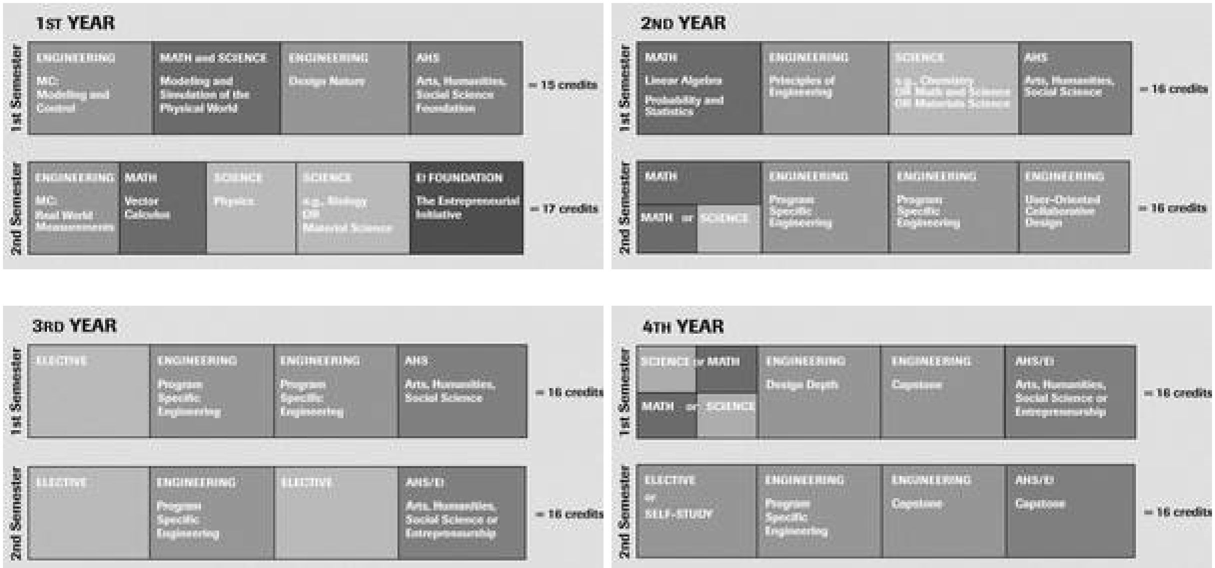
Throughout the curriculum, Olin College integrates the instruction and practice of written, spoken, visual, and graphical communication. Thus, it is not only within the Arts, Humanities, and Social Sciences that an Olin student can expect communication-intensive course work. The Olin curriculum reflects the college’s commitment to the engineer as a highly skilled communicator.

Engineering Capstone

A student’s final year at Olin centers on an ambitious year-long culminating capstone in engineering, through either the Senior Capstone Program in Engineering (SCOPE) project or the Affordable Design and Entrepreneurship (ADE) project. The engineering capstone project engages interdisciplinary student teams in significant design problems with realistic constraints for an external partner and prepares students for work in their chosen careers.

Sample Four-year Schedule

The curriculum provides for considerable flexibility and student choice about how to meet requirements. This chart is an example of one of many ways a student might progress through the four-year program.



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 classes of requirements in order 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 only be satisfied 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 only satisfy one course requirement.

General Distribution and Course Requirements

General Distribution 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.

Area	Minimum Credits Required
Engineering	46
Math and Science	30; of which at least 10 must be Math
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 Credit Requirements. Non-degree credit counts toward the maximum credits per semester, but not toward the minimum.

The AHS Capstone does not count toward the 12 credit AHS minimum.

General Course Requirements

All Olin students, regardless of degree or concentration, must satisfy the following course requirements. The table includes one or more current classes that satisfy each requirement. We strongly encourage students to complete all required 1000 level courses prior to the start of their junior year.

Math and Science

Title	Number	Notes
Modeling and Simulation of the Physical World	MTH 1111 and SCI 1111	
Vector Calculus	MTH 1120	Or designated alternative
Linear Algebra	MTH 2120	Or designated alternative
Probability and Statistics	MTH 2130	Or designated alternative
Foundations of Modern Biology (with laboratory)	SCI 1210	
Chemistry/Materials Science - One of: •Introduction to Chemistry (with laboratory) •Materials Science and Solid State Chemistry (with laboratory) •Organic Chemistry (with laboratory)	SCI 1310 SCI 1410 SCI 2320	
Physics - One of: •Electricity and Magnetism •Mechanics •By petition only: -Modern Physics -Solid State Physics -Advanced Classical Mechanics	SCI 1121 SCI 1130 SCI 2130 SCI 3120 SCI 3130	

Engineering

Title	Number	Notes
Modeling and Control	ENGR 1110	
Real World Measurements	ENGR 1121	
Principles of Engineering	ENGR 2210	
Engineering Capstone - One of: •SCOPE •Affordable Design and Entrepreneurship (ADE)	ENGR 4190 ENGR 4290	Both options are a two consecutive semester course requirement.

Design

Title	Number	Notes
Design Nature	ENGR 1200	
User-Oriented Collaborative Design	ENGR 2250	
Design of Depth Course - One of: •Sustainable Design •Human Factors and Interface Design •Distributed Engineering Design •Product Design and Development •Design for Manufacturing •Systems •Affordable Design and Entrepreneurship (ADE)	ENGR 3210 ENGR 3220 ENGR 3240 ENGR 3250 ENGR 3260 ENGR 3710 ENGR 3290	See the current registration booklet for possible additional options, including special topics courses.

The Design Depth Courses listed above 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 a system, component or process to meet needs.

AHS and Entrepreneurship

Title	Number	Notes

AHS Foundation - One of: • History of Technology: A Cultural and Contextual Approach • The Wired Ensemble: Instruments, Voices, Players • Seeing and Hearing: Communicating with Photographs, Video and Sound • Culture & Difference: An Anthropological Approach • The Human Connection: Tools and Concepts from Anthropology for Understanding Today's World • What is "I" • Identity from the Mind and the Brain • Arts, Humanities, Social Sciences Foundation Topic	AHSE 1100 AHSE 1122 AHSE 1130 AHSE 1140 AHSE 1145 AHSE 1150 AHSE 1155 AHSE 1199	All AHS foundation courses offer: • an introduction and overview of an AHS discipline • writing instruction and practice • an introduction to contextual and critical thinking • and examples of how one might integrate the content and perspectives of different disciplines.
The Entrepreneurial Initiative	AHSE 1500	
AHS or Entrepreneurship Depth of Study One of: • AHS Concentration • Entrepreneurship Concentration and Capstone	AHSE 4190 AHSE 4590	• Students design a sequence of approved AHS discipline courses and must complete a minimum of 12 credits in this area. The 12 credits may be 8 credits of course work and an AHS Capstone Project, AHSE 4190, or the credits may come from a sequence of AHS courses without a project. • 8 credits of approved courses. Students design a sequence of approved Entrepreneurship courses, totaling 8 credits. Students complete this study with a required capstone, AHSE 4590.

Self-Study

The Self-Study Requirement is a graduation requirement that all Olin students must fulfill. Each Olin student will fulfill the institution's self-study requirement by completing four credits of approved coursework that contains the label "This course fulfills the Olin Self-Study requirement." Presently this list includes AHS or E! Capstone Projects (AHSE 4190, AHSE 4590); and Failure Analysis and Prevention (ENGR 3820); certain advanced research projects; or approved independent study activities. All activities that fulfill the self-study requirement will give students experience in identifying areas and questions of interest; developing and following a plan of study in pursuit of understanding important concepts in the proposed area or in pursuit of an answer to the proposed question; and communicating the knowledge they gain, apply, analyze, synthesize, and/or evaluate throughout the investigation. All activities that fulfill Olin's Self-Study requirement must explicitly achieve the following: (1) develop students' skills in working independently to learn challenging material and to tackle challenging problems; (2) develop students' skills in communication relevant to the field and project; (3) hone students' skills and attitudes enabling life-long learning (identifying and addressing one's educational needs in a changing world). Finally, self-study should be sufficiently advanced to be considered equivalent to 3000 or 4000 level material by the supervising faculty member.

Independent Study and Research

In independent study activities, students work with faculty members to design and implement a learning and assessment plan for the study of topics not covered by listed Olin courses. Olin offers opportunities for undergraduate research experiences both during the academic year and during the summer. Students may receive academic credit or pay for a research activity, but not both. Independent study and research credit may be applied toward credit requirements in particular areas (Math/Science/AHS/Entrepreneurship/Engineering) and toward the overall 120 credit requirement. These activities are normally taken Pass/No Credit. In order to use independent study to satisfy a course requirement, prior approval must be obtained from the CSTB and the activity must be taken for a grade. Only in exceptional cases will research be approved to satisfy a course requirement.

Olin College

Electrical and Computer Engineering (ECE)

Electrical and Computer Engineering is a degree program designed to meet ABET Program Criteria in Electrical and Computer Engineering. Olin's ECE degree focuses on the devices and structure of computing and communications systems, with an emphasis on hardware design. The Electrical and Computer Engineering Program has the following three educational objectives:

Program Educational Objective I: Our graduates will be able to make a positive difference within their profession and their community.
Elaboration: Our graduates will demonstrate the ability to recognize opportunity and to take initiative. They will be able to communicate effectively and to work well on teams. They will understand the broad social, economic and ethical implications of their work, and will be cognizant of their professional responsibilities.

Program Educational Objective II: Our graduates will demonstrate technical competence in electrical and computer engineering and creative problem-solving skills that foster success in a variety of postgraduate environments, including professional practice and graduate school.
Elaboration: Our graduates will have a solid grounding in fundamental principles of electrical and computer engineering, mathematics and science and the ability to apply this knowledge to the design, analysis and diagnosis of electrical and computer engineering systems. They will be able to develop creative design solutions that are responsive to technical, social, economic and other considerations.

Program Educational Objective III: Our graduates will be prepared for and capable of appropriate response to social, technical and global changes during their careers.
Elaboration: Our graduates will possess a broad understanding of electrical and computer engineering, mathematics, science, the arts, humanities, social sciences, and entrepreneurship. They will build on this foundation by engaging in independent learning in order to identify and respond to emerging technical and social developments.

The Course Requirements of the ECE program are:

Requirement	Course Name	Number
ECE Math - All of:	Differential Equations Discrete Mathematics	MTH 2140 or designated alternative MTH 2110
ECE - All of:	Signals and Systems Introduction to Microelectronic Circuits Software Design Computer Architecture	ENGR 2410 ENGR 2420 ENGR 2510 ENGR 3410
ECE - One of:	Digital Signal Processing Analog and Digital Communications	ENGR 3415 ENGR 3420
ECE - One of:	Controls Robotics 1 Semiconductor Devices Error Control Codes any level 3000 or higher E:C course, or other course approved by ECE program group	ENGR 3370 ENGR 3390 ENGR 3450 MTH 3140/ENGR 3140

Mechanical Engineering (ME)

Mechanical Engineering is a degree program designed to meet ABET Program Criteria in Mechanical Engineering. The ME requirements emphasize the design of mechanical and thermal/fluid systems. The Mechanical Engineering Program Educational Objectives are:

Program Educational Objective I: Our graduates will be able to make a positive difference within their profession and their community.
Elaboration: Our graduates will demonstrate the ability to recognize opportunity and to take initiative. They will be able to communicate effectively and to work well on teams. They will understand the broad social, economic and ethical implications of their work, and will be cognizant of their professional responsibilities.

Program Educational Objective II: Our graduates will demonstrate technical competence in mechanical engineering and creative problem-solving skills that foster success in a variety of postgraduate environments, including professional practice and graduate school.
Elaboration: Our graduates will have a solid grounding in fundamental principles of mechanical engineering, mathematics and science and the ability to apply this knowledge to the design, analysis and diagnosis of mechanical engineering systems. They will be able to develop creative design solutions that are responsive to technical, social, economic and other considerations.

Program Educational Objective III: Our graduates will be prepared for and capable of appropriate response to social, technical and global changes during their careers.
Elaboration: Our graduates will possess a broad understanding of mechanical engineering, mathematics, science, the arts, humanities, social sciences, and entrepreneurship. They will build on this foundation by engaging in independent learning in order to identify and respond to emerging technical and social developments.

The Course Requirements of the ME program are:

Requirement	Course Name	Number

ME Math:	Differential Equations One of: •Partial Differential Equations •Numerical Methods and Scientific Computing •Nonlinear Dynamics and Chaos •other math course approved by ME program group	MTH 2140 or designated alternative MTH 3120 MTH 3150 MTH 3170
ME - All of:	Mechanics of Solids and Structures Dynamics Thermodynamics Transport Phenomena Mechanical Design	ENGR 2320 ENGR 2340 ENGR 2350 ENGR 3310 ENGR 3330
ME - One of:	Dynamics of Mechanical and Aerospace Structures Mechanical and Aerospace Systems Controls Design for Manufacturing (if not used to satisfy the Design Depth requirement) Robotics 1 Robotics 2 Biomedical Materials Systems (if not used to satisfy the Design Depth requirement) Structural Biomaterials Failure Analysis and Prevention other course approved by ME program group	ENGR 3340 ENGR 3345 ENGR 3370 ENGR 3260 ENGR 3390 ENGR 3392 ENGR 3610 ENGR 3710 ENGR 3810 ENGR 3820

Engineering

The Engineering degree program offers a major in Engineering that is both rigorous and flexible. This program gives students the option to pursue new areas of engineering and interdisciplinary combinations of engineering and other fields. It is also intended to give the college mechanisms for investigating new areas and creating new concentrations. All paths to graduation with the engineering degree provide for all outcomes required by the ABET General Criteria. The Engineering Program has three educational objectives:

Program Educational Objective I: Our graduates will be able to make a positive difference within their profession and their community.
Elaboration: Our graduates will demonstrate the ability to recognize opportunity and to take initiative. They will be able to communicate effectively and to work well on teams. They will understand the broad social, economic and ethical implications of their work, and will be cognizant of their professional responsibilities.

Program Educational Objective II: Our graduates will demonstrate technical competence and creative problem-solving skills that foster success in a variety of postgraduate environments, including professional practice and graduate school.
Elaboration: Our graduates will have a solid grounding in fundamental principles of mathematics, science, and engineering and the ability to apply this knowledge to the design, analysis and diagnosis of engineering systems. They will be able to develop creative design solutions that are responsive to technical, social, economic and other realistic constraints and considerations.

Program Educational Objective III: Our graduates will be prepared for and capable of appropriate

response to social, technical and global changes during their careers.
Elaboration: Our graduates will possess a broad understanding of math, science, engineering, the arts, humanities, social sciences, and entrepreneurship. They will build on this foundation throughout their careers by engaging in independent learning in order to identify and respond to emerging technical and social developments.

Students who choose the Engineering degree may specify a concentration, which is a set of classes that constitute a coherent area of study. A student's concentration appears on the diploma but not on the official transcript. The college offers designated concentrations in Bioengineering, Computing, Materials Science, and Systems. Alternatively, students may design a concentration in another area.

Students who choose the Engineering degree must submit a plan of study along with their declaration of 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.

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

Plans of study are reviewed by the Engineering Program Group. This group is responsible for checking the following 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 designated concentrations and previous student-designed concentrations? If a student-designed concentration is named, is the proposed name accurate and appropriate?

The designated concentrations are examples of recommended programs, but all course plans go through the same review process. The plan of study is provisional. If approved and completed, a student may use it to graduate. Minor substitutions may be made with adviser approval; substantive changes require approval of the Engineering Program Group.

Engineering: Bioengineering (E:Bio)

Bioengineering is an interdisciplinary concentration rooted in engineering, biology, and chemistry. The E:Bio concentration prepares students to approach problems important to biology, medical research, and clinical studies; it provides some of the background required for medical school.

Requirement	Course Name	Number

E:Bio Math	Four credits of advanced Mathematics appropriate to the program of study	
E:Bio Biology	Four credits of advanced Biology	
E:Bio Chemistry/Materials Science	Four credits of Chemistry, Materials Science, or Organic Chemistry in addition to the General Course Requirements	SCI 1310, SCI 1410, SCI 2320
E:Bio Bioengineering	12 credits of coursework appropriate to Bioengineering	

Students wishing to pursue the E:Bio concentration within the Engineering major must develop a specific program of study in consultation with bioengineering faculty. Below are some guidelines on course selection:

Advanced Mathematics courses include MTH 3120 Partial Differential Equations and MTH 3170 Nonlinear Dynamics and Chaos (note that both these courses have MTH 2140 Differential Equations as a prerequisite). Advanced Biology courses include SCI 2210 Immunology and SCI 3210 Human Molecular Genetics in the Age of Genomics. Bioengineering courses include all ENGR 36xx-series courses, as well as ENGR 3810 Structural Biomaterials. E:Bio course plans may include classes at Babson, Brandeis, Wellesley, or other institutions. Note that this is not an exhaustive list of acceptable courses; other courses may be used to fulfill each of these requirements if they are part of an approved course plan.

Students interested in pursuing medical, dental or veterinary school admission should contact Dr. Janey Pratt, Olin Senior Partner in Health Science, as early in their Olin studies as possible, and ensure that their course plan meets the requirements of the programs they are considering.

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.

Requirement	**Course Name**	**Number**
E:C Math	Discrete Mathematics	MTH 2110
E:C - All of:	Software Design Foundations of Computer Science Software Systems eight additional credits in computing	ENGR 2510 ENGR 3520 ENGR 3525

Additional computing credits may include Olin courses such as ENGR 3540 Computational Modeling, ENGR 3410 Computer Architecture, advanced computer science courses at Babson, Brandeis, Wellesley, or study away institutions. ENGR 3220 Human Factors and Interface Design may count toward the course requirements of E:C, but only if it is not used to satisfy the Design Depth requirement.

Engineering: Design (E:D)

E: Design is an interdisciplinary concentration emphasizing synthesis, processes and methods of practice that blends engineering and 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.

Requirement	Description or Course Name	Number
E:D Core	Eight credits of approved Advanced Design courses; Four credits may be met by Design Research	
E:D Electives	Twelve credits of approved coursework appropriate to the program of study	
E:D Portfolio	Two credits of Independent Study on portfolio creation (optional)	

Courses used by a student to meet the Design General Requirements may not simultaneously be used to meet the E: Design Core or Elective 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 the design faculty. Design Research counts as Advanced Design.

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 Elective requirement and not the E: Design Core 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. All programs of study must receive prior approval by design faculty.

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

Engineering: Materials Science (E:MS)

Materials Science is an inherently interdisciplinary field with a strong presence throughout most engineering and science disciplines. Olin's materials science concentration provides an integrated approach to materials, merging a variety of engineering design principles with concepts from solid-state physics and applied chemistry. Students who complete the E:MS concentration will achieve an understanding of structure-property-processing-performance relationships in materials, the ability to apply advanced scientific and engineering principles to materials systems, and the skills to synthesize appropriate technical and contextual information to solve materials selection and design problems.

Requirement	**Course Name**	**Number**
E:MS Math	Differential Equations	MTH 2140 or designated alternative
E:MS	20 credits of engineering subjects appropriate to the program of study with a minimum of twelve credits in materials science subjects.	

Students wishing to pursue the Materials Science concentration within the Engineering major must develop a specific program of study in consultation with materials science and applied chemistry faculty. Such programs may emphasize different aspects of materials science, such as structural materials, solid state properties of materials, processing and manufacturing, or applied chemistry.

Engineering: Systems (E:SYS)

The Systems concentration focuses on the design of products that integrate significant technology from multiple disciplines, with a focus on products that merge ECE and ME. Such products are particularly hard to create because designers tend to have specialized, rather than broad, knowledge of disciplines.

Requirement	**Course Name**	**Number**
E:SYS Math	Signals and Systems Introduction to Microelectronics Circuits Software Design Computer Architecture Analog and Digital Communications	ENGR 2410 ENGR 2420 ENGR 2510 ENGR 3410 ENGR 3420
E:SYS ME – Any two of:	Mechanics of Solids and Structures Dynamics Thermodynamics Transport Phenomena Mechanical Design	ENGR 2320 ENGR 2340 ENGR 2350 ENGR 3310 ENGR 3330
E:SYS	Systems	ENGR 3710

4+1 Bachelor of Science Degree with Wellesley College

The 4+1 program is a way for a Wellesley student to obtain a second bachelor's degree from Olin College through a fifth year of study. Students enrolled in the 4+1 program begin their engineering study while they are enrolled at Wellesley; by the time they complete their Wellesley degrees, 4+1 students have typically completed all of the math and science prerequisites as well as at least five engineering courses towards their Olin degree. Often this is done in the context of completing an Olin certificate program. In their fifth year, 4+1 students enroll at Olin College and spend both semesters in residence there, completing major requirements as well as the senior capstone project.

Students wishing to complete the 4+1 program must, in general, complete their requirements at their home institution, as well as satisfying specific science, math, and engineering requirements for the engineering degree, including a total of at least 32 credit hours of science and mathematics, and at least 48 credit hours of engineering.

Admission to the 4+1 program typically takes place in the student's senior year at Wellesley, and is contingent on the student having already made progress towards the engineering degree. Students admitted to the 4+1 program receive Olin's tuition scholarship, and are eligible for additional financial aid, including scholarships specifically designated for 4+1 students. Students who enroll at Olin to complete the fifth year of the 4+1 Program are guaranteed.

Babson-Olin-Wellesley Sustainability Certificate Program

Addressing the challenge of using earth's resources sustainably requires a collaborative and interdisciplinary approach, in which basic research about the causes and consequences of environmental problems is combined with an understanding of the incentives and processes for a large-scale reworking of economic activity and the technology with which to reconfigure the human effect on the natural world. Wellesley, Olin, and Babson Colleges are uniquely suited to address this challenge by providing a joint program capable of educating students in ways that each cannot accomplish alone. By truly integrating business, engineering, and the liberal arts in the service of environmental sustainability, this program will provide students with the cross- disciplinary academic preparation and the cross-campus cultural collaboration experiences needed to approach environmental issues holistically.

Goals The Sustainability Certificate Program seeks to educate students to make use of the skills, tools, and concepts from the liberal arts, business, and engineering to address environmental challenges and work to move individuals and society to more sustainable practices.

Admission Students ordinarily will declare their intention to pursue the certificate program after completing the Introductory Course; they must do so before enrolling in the Synthesis Course. Students with declared program participation will have preferential enrollment opportunities for the cross-campus electives. Interested and declared students should work with the Sustainability Certificate Campus Advisor for their home institution to pursue the certificate program; students may also contact the overall program director. Advising is a central part of ensuring a coherent structure to the certificate program, so students are encouraged to declare their intention to complete the program as soon as they can.

Completion Requirements There are three components to the 6-course certificate program:
1.Introductory Course
2.Synthesis Course
3.Four electives from a Certificate Program Elective Courses list (http://3collegesbow.org/sustainability.aspx)

The four electives must include one course in each of the three disciplines - business, engineering, and the liberal arts - and must include a course taken at each one of the three institutions. These courses provide an interdisciplinary breadth of knowledge, skills and experiences relating to environmental sustainability. Note that several courses include the requirement that the major course project a student chooses focus on sustainability issues.

The use of the 6 required certificate courses to meet home-institution graduation requirements is limited in the following ways.

•The Introductory and Synthesis courses cannot count towards any other institutional requirement
•Any certificate elective can also count for any distribution requirement
•Only one specific home-institution course requirement can count as a certificate elective (e.g. Olin students can use either Design Nature or Modeling and Simulation as a certificate elective but not both)
•Concentration/major courses can count for certificate home-institution electives
•Any multi-campus course approved as a certificate elective cannot count as an institution specific course

COURSE LISTINGS

Offerings

Information in this catalog is subject to change. Please go to the Student Accounts and Records Center website: http://star.olin.edu 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.

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
MTH	Mathematics
SCI	Science
SUST	Sustainability

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

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 AHSE 1100 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.

Prerequisites and Co-requisites

Prerequisites and co-requisites may occasionally be waived with permission of the course instructor.

Number	Name	Prerequisites	Co-requisites	Credits	Hours	Offered
AHSE 0112	The Olin Conductorless Orchestra	Audition		1 AHS	2-0-1	Fall, Spring
AHSE 1100	History of Technology: A Cultural and Contextual Approach			4 AHS	4-0-8	Fall
AHSE 1122	The Wired Ensemble — Instruments, Voices, Players	Ability to read music		4 AHS	4-0-8	Fall
AHSE 1130	Seeing and Hearing: Communicating with Photo- graphs, Video and Sound			4 AHS	4-0-8	Fall
AHSE 1140	Culture and Difference: An Anthropological Approach			4 AHS	4-0-8	Fall

AHSE 1150	What is “I”?			4 AHS	4-0-8	Fall (not offered every year)
AHSE 1155	Identity from the Mind and the Brain			4 AHS	4-0-8	Fall
AHSE 1500	The Entrepreneurial Initiative			4 AHSE	4-0-8	Fall, Spring
AHSE 2110	The Stuff of History: Materials and Culture in Ancient, Revolutionary and Contemporary Times		SCI 1410	4 AHS	4-0-8	Spring
AHSE 2112	Six Books that Changed the World			2 AHS	4-0-8	TBA
AHSE 2114	Science Fiction and Historical Context			2 AHS	4-0-8	TBA
AHSE 2120	Heroes for the Renaissance Engineer: Leonardo , Nabokov, Bach, Borodin			4 AHS	3-0-9	Alt Spring (odd years)
AHSE 2125	The Engineer’s Orchestra II: Theory, Orchestration, Composition			2 AHS	4-0-8	Alt Fall (odd years)
AHSE 2130	The Intersection of Art and Science			4 AHS	4-0-8	TBA
AHSE 2131	Responsive Drawing and Visual Thinking			4 AHS	4-0-8	Spring
AHSE 2140	Anthropology: Culture, Knowledge, and Creativity	AHS Foundation		4 AHS	4-0-8	Spring
AHSE 2141	Engineering for Humanity		ENGR 2141	2 AHS	4-0-8	Spring
AHSE 3100	Issues in Leadership and Ethics	Student must be in their final year		2 AHSE	2-0-4	Fall
AHSE 3130	Advanced Digital Photography	AHSE 1130		4 AHS	4-0-8	Alt Fall (odd years)
AHSE 3190	Arts, Humanities, Social Sciences Capstone Preparatory Workshop			1 AHS	0-0-3	Fall, Spring
AHSE 3510	New Technology Ventures	AHSE 1500		4 AHSE	4-0-8	Fall
AHSE 4190	Arts, Humanities, Social Sciences Capstone	AHSE 3190 or Permission of Instructor(s)		4 AHS	4-0-8	Fall, Spring
AHSE 4590	Entrepreneurship Capstone	Entrepreneurship track: 8 qualifying credits		4 AHSE	2-0-10	Fall, Spring

ENGR 1110	Modeling and Control		SCI 1111, and MTH 1111	3 ENGR	3-3-3	Fall
ENGR 1121	Real World Measurements			3 ENGR	3-3-3	Spring
ENGR 1200	Design Nature			4 ENGR	6-4-2	Fall
ENGR 1330	Fundamentals of Machine Shop Operations			4 ENGR	4-4-4	Fall, Spring
ENGR 2125	The Engineer's Orchestra I: Acoustics, Waves, and Vibrations			4 ENGR	4-2-6	TBA
ENGR 2141	Engineering for Humanity		AHSE 2141	2 ENGR	4-0-8	Spring
ENGR 2210	Principles of Engineering	ENGR 1110		4 ENGR	4-4-4	Fall, Spring
ENGR 2250	User-Oriented Collaborative Design			4 ENGR	4-4-4	Spring
ENGR 2320	Mechanics of Solids and Structures	ENGR 1121		4 ENGR	4-0-8	Spring
ENGR 2330	Introduction to Mechanical Prototyping	ENGR 1200		4 ENGR	5-3-4	Spring
ENGR 2340	Dynamics		MTH 2140	4 ENGR	4-0-8	Fall
ENGR 2350	Thermodynamics			4 ENGR	4-0-8	Spring
ENGR 2410	Signals and Systems			4 ENGR	4-0-8	Spring
ENGR 2420	Introduction to Microelectronic Circuits	ENGR 1121		4 ENGR	4-4-4	Spring
ENGR 2510	Software Design			4 ENGR	5-0-7 (F) 6-0-6 (S)	Fall, Spring
ENGR 2620	Biomechanics	MTH 1111, MTH 1120 MTH 2120, MTH 2140, SCI1130, SCI1210, or Permission of instructor(s)		4 ENGR	4-0-8	Spring (even years)
ENGR 3140	Error Control Codes	MTH 2120 (required) and MTH 2110 (or another proof based math class)	MTH 3140	2 ENGR	4-0-8	Spring
ENGR 3210	Sustainable Design	ENGR 2250		4 ENGR	4-0-8	Fall
ENGR 3220	Human Factors and Interface Design	ENGR 2250		4 ENGR	4-4-4	Fall, Spring

ENGR 3240	Distributed Engineering Design	ENGR 1200, ENGR 2250		4 ENGR	4-2-6	TBA
ENGR 3250	Product Design and Development	ENGR 2250		4 ENGR	4-0-8	Spring
ENGR 3260	Design for Manufacturing	ENGR 2250		4 ENGR	4-0-8	Spring
ENGR 3310	Transport Phenomena	MTH 1120		4 ENGR	4-0-8	Fall
ENGR 3330	Mechanical Design	ENGR 2320		4 ENGR	4-0-8	Fall
ENGR 3340	Dynamics of Mechanical and Aerospace Structures	MTH 2140, ENGR 2340 or Permission of Instructor(s)		4 ENGR	4-0-8	TBA
ENGR 3345	Mechanical and Aerospace Systems	ENGR 2210 or Permission of Instructor(s)		4 ENGR	4-0-8	TBA
ENGR 3355	Renewable Energy	ENGR 2350		4 ENGR	4-0-8	Fall
ENGR 3370	Controls	ENGR 2410 or ENGR 2340		4 ENGR	4-0-8	Spring
ENGR 3390	Robotics 1			4 ENGR	4-0-8	Fall
ENGR 3392	Robotics 2			4 ENGR	4-0-8	Spring
ENGR 3410	Computer Architecture	ENGR 1121		4 ENGR	4-4-4	Fall
ENGR 3415	Digital Signal Processing	ENGR 2410		4 ENGR	4-0-8	Spring
ENGR 3420	Introduction to Analog and Digital Communications	ENGR 2410		4 ENGR	4-4-4	Fall
ENGR 3426	Mixed Analog-Digital VLSI I	ENGR 2420		4 ENGR	4-4-4	Fall
ENGR 3427	Mixed Analog-Digital VLSI II	ENGR 3426		4 ENGR	4-4-4	Spring
ENGR 3450	Semiconductor Devices	ENGR 1121, SCI 1410 or SCI 3110		4 ENGR	4-4-4	TBA
ENGR 3520	Foundations of Computer Science	ENGR 2510	MTH 2110	4 ENGR	4-0-8	Every 3rd semester (beginning Fall 04)
ENGR 3520A	Foundations of Computer Science Project		ENGR 3520	2 ENGR	1-0-5	TBA
ENGR 3525	Software Systems			4 ENGR	4-4-4	Every 3rd semester (beginning Spring 05)

ENGR 3530	Synchronization			2 ENGR	2-2-2	Every 3rd semester (beginning Spring 05)
ENGR 3540	Computational Modeling	ENGR 2510		4 ENGR	4-0-8	Every year (beginning Fall 05)
ENGR 3600	Topics in Bioengineering			4 ENGR	4-0-8	Fall
ENGR 3610	Biomedical Materials	SCI 1210, SCI 1410		4 ENGR	4-0-8	Fall
ENGR 3620	Cellular Bioengineering	SCI 1210 or Permission of Instructor(s)		4 ENGR	4-0-8	
ENGR 3650	Biomedical Thermodynamics	MTH 1111, MTH 1120, MTH 2120, MTH 2140, SCI1130, SCI1210, or Permission of Instructor(s)		4 ENGR	4-0-8	Alt Spring (odd years)
ENGR 3710	Systems	Completion of other E:SYS requirements		4 ENGR	4-0-8	Fall
ENGR 3810	Structural Biomaterials	SCI 1410, SCI 1210		4 ENGR	4-4-4	Spring
ENGR 3820	Failure Analysis and Prevention	SCI 1410		4 ENGR	4-4-4	Fall
ENGR 4190	Senior Capstone Program in Engineering (SCOPE)		Must be a Senior	4 ENGR	4-0-8	Fall, Spring
ENGR 4190A	Senior Capstone Program in Engineering (SCOPE)		Open to non-Olin students	variable 2 or 4	4-0-8 (4) 2-0-4 (2)	
MTH 1111	Modeling and Simulation of the Physical World		SCI 1111	2 MTH	3-0-3	Fall
MTH 1120	Vector Calculus			2 MTH	2-0-4	Spring
MTH 2110	Discrete Mathematics			4 MTH	4-0-8	Fall
MTH 2120	Linear Algebra			2 MTH	2-0-4	Fall, Spring
MTH 2130	Probability and Statistics			2 MTH	2-0-4	Fall, Spring
MTH 2140	Differential Equations	MTH 1120		2 MTH	2-0-4	Fall, Spring
MTH 2160	Introduction to Mathematical Modeling	MTH 1111	MTH 2120, MTH 2130, and MTH 2140	2 MTH	2-0-4	TBA
MTH 3120	Partial Differential Equations	MTH 2120, MTH 2140		4 MTH	4-0-8	TBA
MTH 3130	Mathematical Analysis	MTH 1120		2 MTH	2-0-4	TBA

MTH 3140	Error Control Codes	MTH 2120 (required), and MTH 2110 (or another proof based math class)	ENGR 3140	2 MTH	4-0-8	Spring
MTH 3150	Numerical Methods and Scientific Computing	MTH 2120, MTH 2140		4 MTH	4-0-8	TBA
MTH 3160	Introduction to Complex Variables	MTH 1120 MTH 2140		4 MTH	4-0-8	TBA
MTH 3170	Nonlinear Dynamics and Chaos	MTH 2120, MTH 2140		4 MTH	4-0-8	Spring
OIE 1000	Olin Introductory Experience			1 non-degree	1-0-3	Fall
OIP 1000	The Olin Internship Practicum	PGP workshops		1	0-0-15	Fall, Spring
SCI 1111	Modeling and Simulation of the Physical World		MTH 1111	2 SCI	3-0-3	Fall
SCI 1121	Electricity and Magnetism		MTH 1120	4 SCI	4-0-8	Spring
SCI 1130	Mechanics			4 SCI	3-3-6	Fall, Spring
SCI 1210	Principles of Modern Biology (with laboratory)			4 SCI	4-3-5	Fall, Spring
SCI 1310	Introduction to Chemistry (with laboratory)			4 SCI	4-3-5	Spring
SCI 1410	Materials Science and Solid State Chemistry (with laboratory)			4 SCI	3-3-6	Fall, Spring
SCI 2130	Modern Physics (formerly SCI 3110)	SCI 1121 or SCI 1130		4 SCI	4-0-8	Fall
SCI 2140	Relativity			2 SCI	2-0-4	Fall (odd years)
SCI 2145	High Energy Astrophysics	SCI 1111		2 SCI	2-0-4	Fall (even years)
SCI 2210	Immunology	SCI 1210		4 SCI	4-0-8	Fall
SCI 2220	Biomechanics	MTH 1111, MTH 1120, MTH 2120, MTH 2140, SCI 1130, SCI 1210, or Permission of Instructor(s)		4 SCI	4-0-8	Spring (even years)
SCI 2320	Organic Chemistry (with laboratory)			4 SCI	4-3-5	Fall
SCI 3120	Solid State Physics	SCI 2130		4 SCI	4-0-8	Alt Spring (odd years)
SCI 3130	Advanced Classical Mechanics	SCI 1130, MTH 2120, MTH 2140		4 SCI	4-0-8	Alt Fall

SCI 3210	Human Molecular Genetics in the Age of Genomics	SCI 1210 or BISC 219 (Wellesley)		4 SCI	4-0-8	Fall
SCI 3320	Bacteriophage Genomics Research Project Laboratory	SCI 1210		4 SCI	2-2-4	Fall, Spring
SCI 3250	Biological Thermodynamics	MTH 1111, MTH 1120, MTH 2120, MTH 2140, SCI 1130, SCI 1210, or Permission of Instructor(s)		4 SCI	4-0-8	Spring (odd years)
SCI 3320	Organic Chemistry II (with laboratory)	SCI 2320		4 SCI	4-4-4	Spring
SUST 2201	Introduction to Sustainability			4 SUST	4-0-8	Fall
SUST 3301	Sustainability Synthesis	SUST 2201, completion of 3 Electives		4 SUST	4-0-8	Spring

Courses within the Olin Introductory Experience (OIE)

OIP 1000
The Olin Internship Practicum
Credits: 1
Hours: 0-0-15
Prerequisites: PGP workshops (see description)
Usually offered: Fall, Spring
Grading Type: Pass/No Credit
For information contact: Professor Mark Somerville

Students get the best preparation for their career by obtaining real life experience, preferably in a work setting. This course would require an international student (F-1 visa status) seeking this type of meaningful, career-building internship to receive the necessary career preparation by way of PGP workshops, obtaining the necessary internal authorizations, and completing, along with their employer, a final work experience evaluation. At least 100 work hours would be required at the internship. In addition, the student must participate in at least two Post Graduate Planning workshops. If two of these are not available, the student may take similar, related workshops, or meet with PGP individually to cover the required material.

ENGR 1110
Introduction to Modeling and Control
Credits: 3 ENGR
Hours: 3-3-3
Co-requisites: MTH 1111 and SCI 1111
Usually offered: Fall
For information contact: Professor Brian Storey

A hands-on class in the modeling and control of compartment systems, including first- and secondorder thermal, mechanical, and electrical systems, the nature of effort and flow (across and through state variables) as universal concepts, power and energy, impedance, damping, passivity, qualitative feedback stability, and hysteretic, P, PI, and PID control. Students will also learn to use MATLAB and Simulink, and to write basic real-time control and simulation software.

ENGR 1200
Design Nature
Credits: 4 ENGR
Hours: 6-4-2
Usually offered: Fall
For information contact: Professor Benjamin Linder

We take nature, an important source of inspiration and understanding, as a theme and develop bioinspired ideas into functional prototypes. Our focus is on the general principles and methods that shape the practice of engineering design. Students complete individual and team projects in a studio environment where we seek to develop a shared practice and understanding of engineering design. Students also gain experience in visualization, experimentation, estimation, fabrication, and presentation as they relate to designing.

MTH 1111 and SCI 1111
Modeling and Simulation of the Physical World
Credits: 2 MTH, 2 SCI
Hours: 6-0-6
Usually offered: Fall
For information contact: Professors John Geddes and Mark Somerville

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.

OIE 1000
The Olin Introductory Experience Seminar
Credits: 1 non-degree
Hours: 1-0-3
Usually offered: Fall
For information contact: Nick Tatar

This course aims to introduce and develop skills that facilitate a successful transition into Olin. This course will cultivate critical and creative thinking skills, self-reflection, teamwork, leadership, and intrapersonal relationships with peers, faculty, and staff. This course is required.

Arts, Humanities, Social Science Foundation

Courses

Options may include one of the following courses or a range of other topics made available:

AHSE 1100
History of Technology: A Cultural and Contextual Approach
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Robert Martello

Throughout this semester we will use different history of technology narratives to explore larger themes. Our narrative case studies will range from bronze age societal studies to cutting edge computing and Internet technologies, and throughout the semester we will compare and contrast these narratives in search of larger trends. We will also identify and investigate broader issues 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 broader issues through targeted writing activities, debates, individual and group presentations, at least one field trip, movie and media studies, and numerous in-class discussions. Students will have a high degree of autonomy, and will set and evaluate their own learning objectives, determine the topic for final projects, and design and facilitate in-class activities throughout the semester.

AHSE 1122
The Wired Ensemble: Instruments, Voices, Players
Credits: 4 AHS
Hours: 4-0-8
Prerequisites: Ability to read music
Usually offered: Fall
For information contact: Professor Diana Dabby

Three concurrent streams comprise The Wired Ensemble:

• composition and performance of original works for instruments and voices

• development of a “Composer’s Tool Chest”

• 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.

AHSE 1130

Seeing and Hearing: Communicating with Photographs, Video and Sound
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Helen Donis-Keller

Seeing and Hearing is a foundation course that is about the communication of ideas developed by research, reflection, and evolving thought, using contemporary digital media tools as a vehicle for expression. In this project-based course, students will have opportunities for hands-on learning in audio recording and editing, photography and printing, and video recording and editing. Science and engineering content are integrated in order to provide a reasonably comprehensive understanding of the devices we use to gather sound and images and in order to understand more fully the properties of seeing and hearing. A major goal is to enlarge our awareness of the environment we inhabit and to respond to the perceived environment by producing original visual and sonic artwork. Students will complete projects including a self-portrait, a sound-piece that is used as an audio track for a short video, a video documentary, and a staged narrative. Our process is to share work through discussion sessions as we follow projects from their initial stages to completion and final presentation. Additional context for Seeing and Hearing is provided by selected readings, visits by guest lecturers, additional faculty and staff participation and by viewing work of other professional practitioners. This course does not require prior experience with image/sound gathering or editing.

AHSE 1140
Culture and Difference: An Anthropological Approach
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Caitrin Lynch

This course introduces students to key concepts and methods in cultural anthropology. Cultural anthropology is the study of how humans organize their lives as members of society, and the ways in which they make these lives meaningful. Through readings on such diverse topics as adolescence in Samoa, epilepsy among Hmong Americans, and McDonald’s in Hong Kong, this course will explore contemporary anthropological approaches to three central questions: 1) What is culture? 2) Does “culture” explain why people do what they do and believe what they believe? 3) What fate and value do cultural differences have in today’s interconnected world?

AHSE 1145
The Human Connection: Tools and Concepts from Anthropology for Understanding Today's World
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Caitrin Lynch

The book Wired to Care opens with the story of a designer who disguised herself as an elderly person to better understand the experiences of the elderly in our society. Author Dev Patnaik explains his interest in this experiment. It comes down to empathy: “All of this is to reclaim a very old idea, that quantitative data and facts are no substitute for real-world experience and human connection.” Anthropologists have long argued for the importance of putting oneself in other people’s shoes for better understanding. The anthropologist Bronislaw Malinowski wrote in 1922 that the goal of the anthropologist “is to grasp the native's point of view, his relation to life, to realize his vision of his world." In this course, students will try out the anthropological methods of participation, observation, interviews, and analysis of cultural materials and texts. This is a hands-on course for students who want to get out and meet people – all with the aim of greater understanding. The course focuses on three thematic topics important to our society in the twenty-first century. Past offerings have focused on aging, religion, health, and globalization. The class includes assignments, events, and interactions that will take students off campus (perhaps to the Needham Senior Center, local coffee shops, and to Boston's ethnic neighborhoods) and will include visitors from area institutions.

AHSE 1150
What is "I"?
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall (not offered every year)
For information contact: Professor Lynn Stein

This interdisciplinary exploration of identity draws on a diverse range of genres in the Humanities, Social Sciences, Arts and Sciences. Prior offerings have drawn from Anthropology, Artificial Intelligence, Biology, Film, History, Literature, Memoir, Neuroscience, Philosophy, Psychology, Political Science, Science Fiction, Sociology, and Visual Arts.

Our goal is to understand how individual perspective (or the illusion of same) comes into being and how our own unique perspectives shape the way that we see the world. Emphasis is placed on communication and context.

AHSE 1155
Identity from the Mind and the Brain
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Jonathan Adler

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.

Arts, Humanities, Social Science and Entrepreneurship

AHSE 0112
The Olin Conductorless Orchestra
Credits: 1 AHS
Hours: 2-0-1
Prerequisites: Audition
Usually offered: Fall, Spring
Grading type: Pass/No Credit
For information contact: Professor Diana Dabby

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. (A student can apply up to 4 OCO credits to the 28 required credits in AHSE, or can petition to apply up to 4 OCO credits to the AHS concentration. Any additional credits, i.e., more than 4, earned by a student enrolling in OCO will show up as additional AHS credits, but will not count toward satisfying the requisite 28 credits in AHSE.)

AHSE 1100
History of Technology: A Cultural and Contextual Approach
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Robert Martello

See description in the Olin Introductory Experience (OIE) section

AHSE 1122
The Wired Ensemble: Instruments, Voices, Players
Credits: 4 AHS
Hours: 4-0-8
Prerequisites: Ability to read music
Usually offered: Fall
For information contact: Professor Diana Dabby

See description in the Olin Introductory Experience (OIE) section

AHSE 1130
Seeing and Hearing: Communicating with Photographs, Video and Sound
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Helen Donis-Keller

See description in the Olin Introductory Experience (OIE) section

AHSE 1140
Culture and Difference: An Anthropological Approach
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Caitrin Lynch

See description in the Olin Introductory Experience (OIE) section

AHSE 1150
What is “I”?
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall (not offered every year)
For information contact: Professor Lynn Stein

See description in the Olin Introductory Experience (OIE) section

This course focuses more on philosophy and artificial intelligence while AHSE 1155: Identity from the Mind and the Brain is more focused on the science of psychology and neuroscience.

AHSE 1155
Identity from the Mind and the Brain
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Jonathan Adler

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.

AHSE 1500
The Entrepreneurial Initiative
Credits: 4 AHSE
Hours: 4-0-8
Usually offered: Fall, Spring

For information contact: Steve Gold

The Entrepreneurial Initiative provides an introduction to the art and science of entrepreneurial thought and action — meaning being able to succeed at times when resource constraints are the norm and the future is uncertain (which describes many of life's most important situations). In this class, you will learn a conceptual and practical framework for taking the entrepreneurial initiative, no matter what the realm. You expect to succeed at Olin, in graduate school, on the job, and possibly in your own venture, and this course will help you to do so by engendering a sense of what it means to be entrepreneurial. The course centers on three competencies: strategy, resourcefulness and persuasive communication. Strategy includes an understanding of, and ability to apply, both causal and effectual logic. Resourcefulness represents a talent for identifying, securing and leveraging resources through the concepts of value exchange and networks. Last but not least, persuasive communication is what enables us to influence others to support our ideas and endeavors with their contributions of time, talent, money and other resources. Mid-semester, you will have the opportunity to put your newfound knowledge and skills to the test during a multi-week, intensive challenge during which you (and several team members) will apply your entrepreneurial skills to effect a positive social or economic change in a real-world setting. In the final section of the course, we will touch upon entrepreneurship as a business endeavor — meaning concepts specifically relating to starting and operating a business. Several speakers will also visit class. In this past, these have included one of the foremost venture capitalists in the U.S., the Chairman of the New York Stock Exchange, and a host of young entrepreneurs. The goal of the course is to introduce you to the art and science of entrepreneurship, and to inspire you to use these concepts to accomplish great things.

AHSE 2110
The Stuff of History: Materials and Culture in Ancient, Revolutionary and Contemporary Times
Credits: 4 AHS
Hours: 4-0-8
Co-requisites: SCI 1410 Section 2
Usually offered: Spring
For information contact: Professor Robert Martello

The lion's share of our history of technology course features a series of readings, lectures, and discussions on the relationship between materials, science, society, and the environment in three historical periods. We start with the material practices and paradigms of Copper and Bronze Age societies, shift to Paul Revere's "Revolutionary" work with various metals and fabrication processes, and conclude with a look at the technologies and challenges of tomorrow. We will emphasize the development of three skills that are vital to our studies: contextual thinking, communication (both written and oral), and historical research methods pertaining to source evaluation and narrative construction.

AHSE 2112
Six Books that Changed the World
Credits: 2 AHS
Hours: 4-0-8
Pre/Co-requisites: AHS Foundation
Usually offered: TBA
For information contact: Professor Robert Martello

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 impact upon the world in which we live. Class meetings will alternate between contextual studies of the historical context of each book (including the author's background, the political and social setting, and other factors) and careful analyses of the works themselves. 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 will be offered during the first half of the semester, will meet twice a week, and will require approximately 12 hours of student effort each week.

AHSE 2114
Science Fiction and Historical Context
Credits: 2 AHS
Hours: 4- 0-8
Pre/Co-requisites: AHS Foundation
Usually offered: TBA
For information contact: Professor Robert Martello

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 will be offered during the second half of the semester, will meet twice a week, and will require approximately 12 hours of student effort each week.

AHSE 2120
Heroes for the Renaissance Engineer: Leonardo, Nabokov, Bach, Borodin
Credits: 4 AHS
Hours: 3-0-9
Usually offered: Alt Spring (odd years)
For information contact: Professor Diana Dabby

To what extent have artists exhibited extraordinary knowledge and ability in science? Does this necessarily infuse their art, and if so, how? Source documents provide the key focus for analysis and critical thought. Artists in the fields of literature, art, and music include Vladimir Nabokov (writer and lepidopterist), Leonardo da Vinci (artist and engineer), Alexander Borodin (composer and chemist), and J. S. Bach (composer, performer, and acoustician). Each of these achieved a self-sufficiency enabling the articulation and realization of work that reveals a singular vision, shaped in part by fluency in both technical and artistic disciplines. Class trips to concerts and museums in Boston and New York enable students to explore firsthand the works of these individuals. Students also have the opportunity to realize projects that meld the arts and sciences in order to experience firsthand the satisfaction and challenges faced by Bach, Borodin, Nabokov, and Leonardo in their desire for knowledge, discovery, and creative expression.

AHSE 2125
The Engineer's Orchestra II: Theory, Orchestration, Composition
Credits: 2 AHS
Hours: 4-0-8
Prerequisites: Wired Ensemble or Permission of Instructor(s)

Usually offered: TBA
For information contact: Professor Diana Dabby

The Engineer's Orchestra II provides 'just-in-time' harmonic and contrapuntal theory for the study of orchestration, with special attention to voice leading, instrumental doubling, spacing, balance, and color. Each week students complete preliminary exercises that target the skills necessary for that week's focus of study. They then orchestrate piano reductions of symphonic excerpts, and vice versa, in order to apply these developing skills. The course progresses from scoring for string, woodwind, and brass ensembles to woodwind-string and woodwind-brass-string combinations, and finally the full orchestra. Class discussions involve students defending their technical and artistic decisions, followed by close examination of the choices made by the original composer. Weekly recorded examples bring to life the fundamental concepts underlying the work of past and contemporary orchestrators. Guest appearances/demonstrations by instrumentalists allow students to sharpen their listening skills as they distinguish among the possibilities for bowings and articulations that inform orchestral writing. The course culminates with each student pursuing a final project, such as an original composition or arrangement.

AHSE 2130
The Intersection of Art and Science
Credits: 4 AHS
Hours: 4-0-8
Usually offered: TBA
For information contact: Professor Helen Donis-Keller

Science and Art are often considered entirely different worlds inhabited by practitioners who have nothing in common. In this course, we will debunk this myth by closely examining the discovery process in both disciplines and by comparing the culture of science to that of art, historically and in the present. We will consider the influence of scientific discoveries, from optics to "new media" on the production of art and discuss the corollary question "Has art influenced the progress of science?" We will also consider ways in which science allows us to understand artists and the work they create. In contemporary society, artists have begun to comment on science, sometimes with disastrous results, which leads us to ask, "What is needed in order to establish a meaningful dialogue between scientists and artists, and does it matter?"

AHSE 2131
Responsive Drawing and Visual Thinking
Credits: 4 AHS
Hours: 4-0-8
Usually offered: Spring
For information contact: Professor Helen Donis-Keller

The course 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 page, gaining critical experience with "idea sketching," an ability that can be put to many uses in future courses (e.g. project design). Students will also draw subjects from life, i.e. stationary objects and life models using media including charcoal, graphite, conté, 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. Several invited speakers will contribute to the course and provide informal critiques of student work. One field trip is planned to the Fogg Art Museum at Harvard University in Cambridge to view art. Other in-class activities will include participation in discussion of drawings (old master and contemporary) that are presented to illustrate various objectives of classroom work (e.g. use of line to indicate form) and group critique sessions. Assessment will be based on weekly homework assignments, classroom work, and three drawing projects to be completed outside of class.

AHSE 2140
Anthropology: Culture, Knowledge and Creativity
Credits: 4 AHS
Hours: 4-0-8
Prerequisites: AHS Foundation
Usually offered: Spring
For information contact: Professor Caitrin Lynch

Anthropological theories and methods help us understand human behavior and values. Broadly speaking, anthropologists ask, “Why do people do what they do and believe what they believe?” Today, anthropologists study a wide range of contemporary social issues, such as international development, garment manufacturing, the production of scientific knowledge, female “circumcision,” and intellectual property. In this course, we will read about, debate, and discuss these and other issues in order to probe into the meanings of culture, knowledge, and creativity.

• What do anthropologists mean by culture?

• What does it mean to take cultural difference seriously?

• Does culture have an influence on what is considered legitimate “knowledge”?

• If knowledge is “situated,” what happens when one form of knowledge comes in contact with another (for instance in discussions of global human rights)?

• What is the relationship between cultural difference, situated knowledge, and human creativity?

• Does globalization threaten to destroy creativity, stifle innovation, and erase difference?

After we learn how anthropologists deal with these questions at a range of research sites, we will end the course with our own anthropological studies that utilize what we have learned earlier in the course. Students will conduct short researchprojects that examine social issues pertaining to the use of the Internet in the United States. By ending with a study of ourselves, students will see how creative we really are; that we, too, have culture; and that what we consider legitimate knowledge is culturally situated. The professor will assume no prior knowledge of anthropology. Skills to be developed include critical reading, critical thinking, writing and analysis, presenting arguments in oral and visual form, and working on projects in small groups. The following texts will be used, among others: Jean Davison, Voices from Mutira: Change in the Lives of Gikuyu Women, Daniel Miller and Don Slater, The Internet: An Ethnographic Approach, Jeremy MacClancy, Exotic No More: Anthropology on the Front Lines.

AHS 2141
Engineering for Humanity
Credits: 2 AHS
Hours: 6-0-6

Co-requisite: ENGR 2141
Usually offered: Spring
For information contact: Professors Caitrin Lynch and Lynn Andrea Stein

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.

Our client population for the current version of this course is senior citizens who live in their own homes and who are recruited before the class begins. 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 AHS 2141 and ENGR2141 for a total of 4 credit hours.

AHSE 3100
Issues in Leadership and Ethics
Credits: 2 AHSE
Hours: 2-0-4
Pre-requisite: Students must be in their final year.
Usually offered: Fall
For information contact: Professor Richard Miller

This course examines the intersection of leadership and ethics in business, engineering, and more general contexts. Readings will include material on the definition and history of ethics and morality in the U.S., the definition and development of leadership skills in a professional context, the role of ethics in the professions, and case studies involving the intersection of leadership and ethics. The course will be structured as a seminar, involving guest speakers and interactive case studies. Enrollment will be limited to 8 students from each college in the final semester of their undergraduate program. The course is taught by President Kim Bottomly of Wellesley College, President Len Schlesinger of Babson College, and President Richard Miller of Olin College.

AHSE 3130
Advanced Digital Photography
Credits: 4 AHS
Hours: 4-0-8
Prerequisites: AHSE 1130 or Permission of Instructor(s)
Usually offered: Alt Fall (odd years)
For information contact: Professor Helen Donis-Keller

In this course, students will develop a personal photographic vision and become acquainted with the work of leading contemporary photographers. A critical awareness of the medium of photography and the history of the still photographic image will also be fostered through selected readings, discussions, and visits to galleries and museums. While communication with visual images is paramount, technical issues will be addressed in some depth. For example, there will be instruction and practice with color management methods, advanced Adobe Photoshop, basic bookbinding methods, and lighting techniques. Regular assignments and group critiques will help monitor progress and inspire new directions. The culminating project will be the design and construction of an artist's book by each member of the class.

AHSE 3190
Arts, Humanities, Social Sciences Capstone Preparatory Workshop
Credits: 1 AHS (pass/no credit)
Hours: 0-0-3
Usually offered: Fall, Spring
For information contact: Professor Gillian Epstein

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.). Olin strongly recommends that all students complete the AHS Capstone Preparatory Seminar before taking AHSE 4190 (AHS Capstone Project).

AHSE 3510
New Technology Ventures
Credits: 4 AHSE
Hours: 4-0-8
Prerequisites: AHSE 1500
Usually offered: Fall
For information contact: Professor Stephen Schiffman

Creating a new venture that has technology as a basis for its products or services presents special challenges. On one hand is the "push" of new technology, as evidenced by the plethora of scientific invention and technological innovation. On the other hand is the "pull" of the market as it presents new entrepreneurial opportunities. Other key challenges present themselves in areas of intellectual property protection, team building and funding opportunities. In this course we will explore entrepreneurship in technology industries in depth with the hope of penetrating the popular veneer, and uncovering the guts of starting a growing new technology ventures. Of course, there is a lot about new technology venturing that is common to all new venture creation, and also the qualities entrepreneurs demonstrate are valuable in a wide spectrum of life's activities. A unique aspect of this course is its desire to include students from Babson as well as the F.W. Olin College of Engineering. Particular value from this intermingling will be evidenced in the true interdisciplinary nature of the course field project teams that are formed, and the ability for students to begin to develop networks of relationships outside their individual domains of business or engineering.

Primary Course Objectives:

1. To investigate the components, tools, and practices of technology entrepreneurship: identifying new venture opportunities, evaluating the viability of a new business concept, calibrating risk of successful technology development, protecting intellectual property, building a team that possesses

the attributes necessary for success, obtaining appropriate financing, writing a business plan, and developing an investor presentation, creating an entrepreneurial culture that increases the odds of success, and creating liquidity for shareholders.

2. To identify and exercise entrepreneurial skills through classroom debate and assignments.

3. To introduce students to a variety of technology entrepreneurs. Case studies are used as tools for discussion, and are augmented with readings and guest speakers. The core project for this course will be the development of a technology based business plan. Students will form teams to explore a business opportunity, and develop a business plan and investor presentation.

AHSE 4190
Arts, Humanities, Social Sciences (AHS)Capstone
Credits: 4 AHS
Hours: 4-0-8
Prerequisites: AHSE 3190 or Permission of Instructor(s)
Usually offered: Fall, Spring
For information contact: Professor Robert Martello

The AHS Capstone is an advanced, self-designed AHS project that builds upon a student's prior experience in one or more AHS disciplines. All students must complete either an AHS Capstone or an Entrepreneurship Capstone in order to graduate. AHS Capstones must be proposed to the AHS Committee and approved by the end of the academic year prior to the Capstone except in extenuating circumstances. Additional information on the AHS Capstone is available at http://projects.olin.edu/ahs. 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 strongly recommends that all AHS Capstone students first complete the AHS Capstone Preparatory Seminar. Please contact the AHS Committee at ahs@olin.edu with any questions.

AHSE 4590
Entrepreneurship Capstone
Credits: 4 AHSE
Hours: 2-0-10
Prerequisites: Entrepreneurship track; 8 qualifying credits
Usually offered: Fall, Spring
For information contact: Professor Stephen Schiffman

The Entrepreneurship Capstone is an advanced, intensive experience designed to complete a student's undergraduate study of entrepreneurship. All students are required to complete an AHS or Entrepreneurship capstone in order to graduate. The Entrepreneurship Capstone is designed as a seminar that enables students to interact with an experienced entrepreneur in order to accomplish three objectives. First, students will spend the majority of the semester focused on an individual project, the goal of which is expertise in a particular entrepreneurial or business topic. These projects are defined by each student in collaboration with the instructor, and are expected to include a substantial educational component that builds knowledge and expertise throughout the course of the semester. Second, students will undertake one or two assigned projects to strengthen their understanding of entrepreneurship. For example, this may involve an assigned paper/presentation and a community outreach project. Third, students will have the chance to fill knowledge gaps regarding the theory and practice of entrepreneurship. Please contact the instructor with any questions about the course or prerequisites.

Bold Text

Engineering

ENGR 1110
Modeling and Control
Credits: 3 ENGR
Hours: 3-3-3
Co-requisites: MTH 1111 and SCI 1111
Usually offered: Fall
For information contact: Professor Brian Storey

See description in the Olin Introductory Experience (OIE) section

ENGR 1121
Real World Measurements
Credits: 3 ENGR
Hours: 3-0-3
Usually offered: Spring
For information contact: Professor Brian Storey

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 where measurements are made outside the controlled environment of the classroom.

ENGR 1330
Fundamentals of Machine Shop Operations
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 1200
Usually offered: Fall and Spring terms
For information contact: David Anderson and Bruce Andruskiewicz

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).

ENGR 2125
The Engineer's Orchestra I: Acoustics,Waves, and Vibrations
Credits: 4 ENGR
Hours: 4-2-6
Prerequisites: ENGR 1121
Co-requisites: Math 2140 or Permission of Instructor(s)
Usually offered: TBA
For information contact: Professors Christopher Lee and Diana Dabby

The Engineer's Orchestra provides an introduction to acoustics, waves, and vibrations via musical instruments. Students address the physics of orchestral instruments (winds, strings, and percussion) both qualitatively and quantitatively. Topics include one-dimensional transverse and longitudinal waves, traveling and standing wave solutions to the wave equation, and an introduction to spherical waves with relevant hands-on demonstrations. Modeling and analysis concepts will be introduced to support students in the design and construction of their own physical or virtual musical instruments.

ENGR 2141
Engineering for Humanity
Credits: 2 ENGR
Hours: 6-0-6
Co-requisite: AHS 2141
Usually offered: Spring
For information contact: Professors Caitrin Lynch and Lynn Andrea Stein

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.

Our client population for the current version of this course is senior citizens who live in their own homes and who are recruited before the class begins. 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 AHS 2141 and ENGR2141 for a total of 4 credit hours.

ENGR 2210
Principles of Engineering
Credits: 4 ENGR
Hours: 4-4-4

Prerequisites: ENGR 1110
Usually offered: Fall, Spring
For information contact: Professor Bradley Minch

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.

ENGR 2250
User-Oriented Collaborative Design
Credits: 4 ENGR
Hours: 4-4-4
Usually offered: Spring
For information contact: Professor Benjamin Linder

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.

ENGR 2320
Mechanics of Solids and Structures
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 1121
Usually offered: Spring
For information contact: Professor Christopher Lee

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.

ENGR 2330
Introduction to Mechanical Prototyping
Credits: 4 ENGR
Hours: 5-3-4
Prerequisites: ENGR 1200
Usually offered: Spring
For information contact: Professor David Barrett

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.

ENGR 2340
Dynamics
Credits: 4 ENGR
Hours: 4-0-8
Co-requisite: MTH 2140
Usually offered: Fall
For information contact: Professor Christopher Lee

With an emphasis on understanding fundamental concepts, students will learn to create and analyze mathematical models for mechanical and electromechanical systems that are changing in time. Equations of motion for 3D rigid bodies and systems will be derived using conservation of momentum and energy methods. Concepts involving equilibrium, linearization, and stability will be applied to study dynamic response in both the time and frequency domains through time-integration, transfer function, and state-space analysis. The idea of feedback control is introduced. Coursework and projects will involve examples such as robots, mechanisms, vehicles, and aircraft/spacecraft.

ENGR 2350
Thermodynamics
Credits: 4 ENGR
Hours: 4-0-8
Usually offered: Spring
For information contact: Professor Brian Storey

This course covers the fundamental principles of thermodynamics and physical chemistry as applied to engineering systems. This course provides a foundation in fundamental thermodynamic phenomena, including the first and second laws of thermodynamics, thermodynamic properties, equations of state in real and ideal gases, and chemical equilibrium. The basic laws are used to understand and analyze the performance and efficiency of systems, such as automobile engines, gas turbines, steam power plants, and refrigerators.

ENGR 2410
Signals and Systems
Credits: 4 ENGR
Hours: 4-0-8
Usually offered: Spring
For information contact: Professor José Oscar Mur-Miranda

Linear system theory is a powerful set of mathematical tools used broadly across science and engineering. Signals represent the transfer of information or power, while systems represent operations on these signals. This course presents fundamental concepts from linear systems such as convolution, impulse and step response, Fourier transforms, sampling and modulation. These concepts are presented within the framework of linear operators and/or transforms in discrete and/or continuous time. Applications include filters, system identification, deconvolution, feedback and control, and communications.

ENGR 2420

Introduction to Microelectronic Circuits
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 1121
Usually offered: Spring
For information contact: Professor Bradley Minch

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, cascodes, 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.

ENGR 2510
Software Design
Credits: 4 ENGR
Hours: 5-0-7 (Fall); 6-0-6 (Spring)
Usually offered: Fall, Spring
For information contact: Professor Allen Downey

This course is an introduction to software design. It focuses on a model of computation as a set of simultaneous ongoing entities embedded in and interacting with a dynamic environment, for example: computation as it occurs in spreadsheets, video games, web applications, and robots. A major component of the class is a weekly three-hour, in-class laboratory. Much of this laboratory is spent in collaborative work on program development, with an emphasis on student-student interaction and student-student teaching, facilitated and enriched by the course staff. In addition, design and implementation work is supplemented with observational laboratory assignments, inviting students to consider not only how to build a program, but how to anticipate its behavior and how to modify that behavior. Both students with no prior background and students with background comparable to the CS AP should both find this course interesting and worthwhile.

ENGR 2620
Biomechanics
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: MTH 1111, MTH 1120, MTH 2120,
MTH 2140, SCI1130, SCI1210, or
Permission of Instructor(s)
Usually offered: Spring (even years)
For information contact: Professor Yevgeniya V. Zastavker

Why is a giraffe’s head so small in comparison to the rest of its body? Why do babies’ heads flatten when they sleep in the same position? Why do knees bend only in one direction? Why are people taller in the morning? In this course, we will study the nature and function of human body and its movement with specific emphasis on movements produced in sport, dance, and every day physical activities. The principles of Newtonian mechanics, statics, and dynamics will be applied to discuss behavior of bones, tendons, ligaments, and muscles during human movement. This course is cross-listed as SCI 2220.

ENGR 3140
Error Control Codes
Credits: 2 ENGR
Hours: 4-0-8
Prerequisites: MTH 2120 (required) and MTH 2110
(or another proof based math class)
Co-requisite: MTH 3140
Usually offered Spring
For information contact: Professor Sarah Spence Adams

Error-control codes are used to detect and correct errors that occur when data are transmitted across a noisy channel. This course provides an introduction to error-control codes, including linear, cyclic, binary, and non-binary codes. Mathematics such as modular arithmetic and introductory ring and field theory will be introduced and used extensively. Students must simultaneously enroll in MTH3140 and ENGR 3140 for a total of 4 credit hours.

ENGR 3210
Sustainable Design
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2250
Usually offered: Fall
For information contact: Professor Benjamin Linder

This course provides a comprehensive overview of sustainable product design. Emphasis is placed on learning and using green design principles, methods, tools and materials. Examples include life cycle assessment, eco-efficiency and eco-effectiveness. A system perspective highlighting material and energy flows over the complete product life cycle is used to structure course material. Students complete substantial reading, investigate existing products and develop their own product ideas.

ENGR 3220
Human Factors and Interface Design
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 2250 User-Oriented
Collaborative Design (required); ENGR 2510
Software Design or other software development experience (recommended)
Usually offered: Fall or Spring
For information contact: Professor Lynn Stein

A hands-on exploration of the design and development of user interfaces, taking into account the realities of human perception and behavior, the needs of users, and the pragmatics of computational infrastructure and application. Focuses on understanding and applying the lessons of human interaction to the design of usable computer applications; will also look at lessons to be learned from less usable systems. This course will mix studio (open project working time) and seminar (readings and discussion) formats.

ENGR 3240
Distributed Engineering Design
Credits: 4 ENGR
Hours: 4-2-6

Prerequisites: ENGR1200; ENGR2250
Usually offered: TBA
For information contact: Professor Ozgur Eris

As members of a geographically distributed design team, students learn to develop and manage design processes that allow them to innovate within a multi-cultural context. Given that industry practices are increasingly global in nature, this modality strongly resembles how a significant degree of product development is performed across the world today. Students are first exposed to distributed teamwork principles, and upon completion of a design project, revisit and evaluate their efficacy.

ENGR 3250
Product Design and Development
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2250
Usually offered: Spring
For information contact: Professor Benjamin Linder

Interdisciplinary teams of students from Babson College, the Rhode Island School of Design (RISD) and Olin develop new products. A comprehensive design process is employed, which addresses opportunity recognition, user characterization, alternatives development and analysis, and prototyping. Particular attention is paid to developing products that meet users' needs and have a viable path to market. Class will be held at all three schools. Transportation to class will be provided. Teamwork might require travel to RISD.

ENGR 3260
Design for Manufacturing
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2250
Usually offered: Spring
For information contact: Professor David Barrett

This course introduces the principles of design for manufacturability and assembly. A variety of manufacturing processes are covered with a special emphasis placed on injection molding and electronic circuit board fabrication. In the first project, students design, manufacture and assemble a product using these processes. In the second project, students redesign an electro-mechanical product for high-volume manufacture. Visiting designers present case studies of products that were recently or are currently in production.

ENGR 3290
Affordable Design and Entrepreneurship (ADE)
Credits: 4 ENGR
Hours: 2-2-8
Prerequisites: AHSE 1500, ENGR 2210 and ENGR2250
Usually offered: Fall and Spring
For information contact: Professor Ben Linder

Students gain experience innovating to address social challenges through a design and entrepreneurship approach that emphasizes context, collaboration, and sustainability. The focus is on alleviating poverty by deploying innovations in communities that generate income and meet daily human needs in areas like energy, water, health, agriculture, transportation, and communication. For example, students might create and test the technology for a micro energy utility, such as a concentrated-solar battery charging station, and the business model that makes it viable.

The course is run as a firm where students work in teams with community partners nationally and internationally to co-create and launch new products and ventures. Topics covered include the conditions and causes of poverty, approaches to poverty alleviation, cultural awareness and community engagement, affordable design principles and practices, and social venture models and strategies including financing and scaling. Groups of students travel to partner sites in countries like India, Morocco, Ghana and the U.S. to build relationships, gain contextual awareness, and implement projects.

This course is part of the ADE Program that also includes placement assistance to help students find internship and job opportunities in social enterprise. ADE is offered jointly with Babson College where students enroll in EPS 4515. Olin students can elect ADE as an alternative to the SCOPE Program to fulfill the 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. They cannot change programs once they have completed registration. 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 can switch to ENGR 4290 for Capstone credit.

ENGR 3310
Transport Phenomena
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: MTH 1120
Usually offered: Fall
For information contact: Professor Brian Storey

This course introduces the basic physics and applications of the transport of heat, mass, and momentum. Topics in fluid dynamics include kinematics, conservation laws, dynamic similarity, and laminar flow solutions. Topics in heat and mass transfer include internal and external convection, free convection, boiling and condensation, and the analogy between heat and mass transport. Applications in aerodynamics, geophysical flows, manufacturing processes, and biological systems will be discussed.

ENGR 3330
Mechanical Design
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2320
Usually offered: Fall
For information contact: Professor David Barrett

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 axels; 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.

ENGR 3340

Dynamics of Mechanical and Aerospace Structures
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: MTH 2140, ENGR 2340 or Permission of Instructor(s)
Usually offered: TBA
For information contact: Professor Christopher Lee

Fundamental techniques for the analysis of the dynamic behavior of mechanical and aerospace structures are studied through case projects that involve both computational analysis and experimental measurements. Topics will be selected from areas such as vibration analysis, flexible body dynamics, aerodynamics, and aero-elasticity. Projects may include the design and construction of vibration absorbers or energy harvesting systems, the dynamics and stability of aerospace vehicles, lift and drag of airfoils, or flutter instability of elastic structures.

ENGR 3345
Mechanical and Aerospace Systems
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2210 or Permission of Instructor(s)
Usually offered: TBA
For information contact: Professor Christopher Lee

A student team will work in the manner of a small engineering research and development company to develop a mechanical or aerospace system to address a current market need. A comprehensive system design will be developed based upon quantitative analysis using commercial simulation software. Prototype systems will be fabricated, evaluated and refined to meet requirements, specifications, and performance objectives.

ENGR 3370
Controls
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2410 or ENGR 2340
Usually offered: Spring
For information contact: Professor Christopher Lee

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.

ENGR 3390
Robotics 1
Credits: 4 ENGR
Hours: 4-0-8

Usually offered: Fall
For information contact: Professors David Barrett or Andrew Bennett

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.

ENGR 3392
Robotics 2
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 3390
Usually offered: Spring
For information contact: Professors David Barrett or Andrew Bennett

This course combines the components of Robotics 1 (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.

ENGR 3410
Computer Architecture
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 1121
Usually offered: Fall
For information contact: Professor Mark Chang

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.

ENGR 3415
Digital Signal Processing
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2410
Usually offered: Spring
For information contact: Professor Diana Dabby 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.

ENGR 3420
Introduction to Analog and Digital Communications
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 2410 or Permission of Instructor(s)
Usually offered: Fall
For information contact: Professor Siddhartan Govindasamy

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.

ENGR 3426
Mixed Analog-Digital VLSI I
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 2420
Usually offered: Fall
For information contact: Professor Bradley Minch

This course will provide an overview of mixed-signal (analog and digital) integrated circuit design in modern complementary 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 will be sent out for fabrication at the end of the semester if they enroll in MADVLSI II.

ENGR 3427
Mixed Analog-Digital VLSI II
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 3426
Usually offered: Spring
For information contact: Professor Mark Chang

This course will provide an overview of mixed-signal testing methodologies, exposure to more advanced integrated circuit topics, and an opportunity to test the custom chips designed in MADVLSI I through the design and fabrication of a custom printed circuit board (PCB) featuring their own integrated circuit. Students will participate in collaborative teaching of some advanced topics in a seminar-style format.

ENGR 3450
Semiconductor Devices

Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: ENGR 1121; SCI 1410 or SCI 3110
Usually offered: TBA
For information contact: Professor Sherra Kerns

Introduction to semiconductor device fabrication,operation, and design. Emphasis on diodes and transistors, with some exploration of speculative technologies. Students will conduct a project of their own choosing involving either device characterization or device simulation using modern tools.

ENGR 3520
Foundations of Computer Science
ENGR 3520A
Foundations of Computer Science Project
Credits: 4 ENGR (ENGR 3520); 2 ENGR (ENGR3520A)
Hours: 4-0-8 (ENGR 3520); 1-0-5 (ENGR 3520A)
Prerequisites: ENGR 2510
Co-requisites: MTH 2110
Usually offered: Every 3rd Semester (beginning Fall 04)
For information contact: Professor Lynn Stein

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. Students may optionally enroll only in ENGR 3520; these students will be excused from the programming/project component of the course. Students wishing to register for the full six credit course should register for both ENGR 3520 and ENGR 3520A.

ENGR 3525
Software Systems
Credits: 4 ENGR
Hours: 4-4-4
Usually offered: Every 3rd Semester (beginning Spring 05)
For information contact: Professor Allen Downey

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.

ENGR 3530
Synchronization
Credits: 2 ENGR
Hours: 2-2-2
Usually offered: Every 3rd Semester (beginning Spring 05)
For information contact: Professor Allen Downey

When multiple programs run at the same time, they can interact in complex ways, yielding unpredictable behavior at best and impenetrable bugs at worst. Synchronization is the process of imposing timing constraints in order to guarantee the correct execution of programs. This class presents a series of synchronization “puzzles” and gradually develops a set of tools for dealing with even the hairiest synchronization problems.

ENGR 3540
Computational Modeling
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: ENGR 2510 or equivalent
Usually offered: Every 3 Years (beginning Fall 05)
For information contact: Professor Allen Downey

The availability of cheap computation has created a new way of understanding the world. Along with experiment and theory, computational modeling provides new tools for analysis, explanation and prediction. This class looks at the history of this revolution and the technology that underlies it. We will survey a range of literature, from the skeptical to the exuberant, and make a critical evaluation of this putative paradigm shift. Students will learn the skills of computational modeling, with an emphasis on discrete and stochastic models, and apply them to problems in a range of fields including engineering and the natural and social sciences. Basic programming ability, in any language, is a prerequisite.

ENGR 3600
Topics in Bioengineering
Credits: 4 ENGR
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Alisha Sarang-Sieminski

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. Topics to be covered include tissue engineering, use of microfluidic 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.

ENGR 3610
Biomedical Materials
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: SCI 1210 and SCI 1410, or Permission of Instructor(s)
Usually offered: Fall
For information contact: Professor Debbie Chachra

The body is a harsh environment for synthetic materials; not only is it warm, wet, and salty, but there are enzymes and cells whose function is to identify and destroy anything foreign. Conversely, implanted materials can provoke unexpected responses from biological systems. This course is an overview of biological interactions with materials, with a special emphasis on the role of the in vivo milieu on failure in medical devices. Topics will include coagulation, inflammation, and immune responses to materials, cell-surface interactions, and the mechanical interactions of materials and tissue, together with emerging fields such as drug-delivery and neuron-silicon interfaces. Readings will be drawn primarily from the current literature.

ENGR 3620
Cellular Bioengineering
Credits 4 ENGR
Hours 4-0-8
Usually offered: Fall
Prerequisites: SCI 1210, or Permission of Instructor(s)
For information contact: Professor Alisha Sarang-Sieminski

This course aims to give students an appreciation of the power of using quantitative approaches to increasing our understanding of biological phenomena. Receptor-ligand binding will be considered and compared to experimental data to discuss mechanisms in cell signaling studies. Basic binding models will be expanded to consider the effect of forces in situations such as white blood cells rolling, detaching, and adhering during surveillance of blood vessels. We will consider the effects of forces from the molecular to the whole-cell level. How do cells exert force? And how can we measure those forces? How do the properties of the substrates cells attach to affect their behaviors? How can we translate observations made in the 2D environment to the 3D environment? And how are these similar and different? These concepts will be explored to study the effect of forces in cellular processes such as migration, traction generation, differentiation, signaling and gene expression.

ENGR 3650
Biological Thermodynamics
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: MTH 1111, MTH 1120, MTH 2120, MTH 2140, SCI1130, SCI1210, or Permission of Instructor(s)
Usually offered: Alt Spring (odd years)
For information contact: Professors Yevgeniya V. Zastavker and Alisha Sarang-Sieminski

The beauty and depth of this subject cannot be described better than with the words of one of the greatest physicists of the 20th century, Arnold Sommerfeld, ‘’Thermodynamics is a funny subject. The first time you go through it, you don’t understand it at all. The second time you go through it, you think you understand it, except for one or two points. The third time you go through it, you know you don’t understand it, but by that time you are so used to the subject, it doesn’t bother you anymore’’. In this course we will venture into the depths of thermodynamics and statistical mechanics, while concentrating on applications of the abstract concepts to biological, biochemical, and biophysical phenomena and drawing from contemporary bioengineering problems. This course provides an introduction to the study of energy transformations in biological systems as well as thermodynamics and kinetics of structure formation and association of biomolecules. Topics covered include energy and its transformation, the First and Second Law of Thermodynamics, Gibbs Free Energy, statistical thermodynamics, binding equilibria and reaction kinetics, and a survey of other interesting areas of biological thermodynamics, particularly the origin of life on Earth. Topics have relevance to numerous pertinent biological/ bioengineering applications including diseases based on phase transitions (e.g., cataract of the eye, Alzheimer’s disease, etc.), oxygenation of hemoglobin; protein folding, aggregation, and binding; assembly of everything from the phospholipids bilayer to biomaterials; the macroscopic mechanical properties of biomaterials and even cells; creation and operation of devices at the nano- and micro-scales; understanding the basis of mass transport; osmotic pressure relevant to cells and microvascular filtration; receptor-ligand binding; the melting and annealing of DNA. The concepts employed in this course have relevance to students interested in many disciplines, including Bioengineering, Materials Science, Biology and Chemistry. This course is cross-listed as SCI 3250.

ENGR 3710
Systems
Credits: 4 ENGR
Hours: 4-0-8
Prerequisites: Completion of other E:SYS requirements or Permission of Instructor(s)
Usually offered: Fall
For information contact: Professor Andrew Bennett

This course introduces students to the art and science of interdisciplinary design. Students analyze the process used to develop example products that required expertise in many areas and creativity and trade-off consideration amongst all. Students learn about overarching principles that enable creators of broad interdisciplinary systems to succeed. Students will also work in teams and take on roles as design specialists in a variety of fields. Each team is given the task to design in detail a hypothetical product that can succeed only if interdisciplinary creativity is fostered and tradeoffs are made by every team member, as well as the group as a whole.

ENGR 3810
Structural Biomaterials
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: SCI 1410 and SCI 1210, or Permission of Instructor(s)
Usually offered: Spring
For information contact: Professor Debbie Chachra

How is a blood vessel like a garden hose? Why are seashells strong (and beautiful) even though they are made of chalk? How can your opaque white tendons be made of the same material as your transparent corneas? This course focuses on the materials science of natural tissues, primarily ones that fill structural roles, including bone, teeth, tendon, nacre, and wood, with an emphasis on how they are similar and different to 'engineering' materials. Additional material may include scaffolds for tissue engineering, biomimetic materials and mechanical properties of individual cells.

ENGR 3812
Solid State Physics
Credits: 4 ENGR
Hours: 4-0-8
Prerequisite: SCI 2130
Usually offered: Alt Spring (odd years)
For information contact: Professor Rebecca Christianson

Why do metals conduct heat well while insulators do not? Why is silicon a better semiconductor than diamond, even though they have the same structure? Why is lead a good superconductor at low temperature, while copper is not? We will explore the current understanding of insulators, metals, semiconductors and superconductors through some of the basic tools of solid state physics, and will learn how to apply these tools to the novel materials being developed today. This course is cross-listed as SCI 3120.

ENGR 3820
Failure Analysis and Prevention
Credits: 4 ENGR
Hours: 4-4-4
Prerequisites: SCI 1410
Usually offered: Fall
For information contact: Professor Jonathan Stolk

Students will complete projects and case studies to gain practical experience in the analysis of fractured and failed engineering materials and components. The course focus will be on material microstructure and the micro-mechanisms of fracture, and topics will include failure analysis methodology, mechanisms of failure, fracture classifications, corrosion and environmental factors, fractography, and design for failure prevention. Students will learn advanced materials characterization techniques including scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS) and compositional dot mapping, x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), optical microscopy, and fracture surface sample preparation.

ENGR 4190
Senior Capstone Program in Engineering
(SCOPE)
NOTE: this course is typically taken in consecutive fall
and spring semesters of a student's final full academic year.
Credits: 4 ENGR (Fall) and 4 ENGR (Spring)
Hours: 4-0-8 (Fall) and 4-0-8 (Spring)
Co-requisites: Must be a senior
Prerequisites: Enrollment in second semester SCOPE requires
successful completion of first semester SCOPE.
Usually offered: Fall, Spring
For information contact: Professor Andrew Bennett and Alisha Sarang-Sieminski

SCOPE is a two-course requirement for all Olin seniors. It incorporates formal, team-based, yearlong 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.

ENGR 4190A
Senior Capstone Program in Engineering
(SCOPE)
Credits: variable 2 or 4
Hours: 2-0-4 (2 credits) or 4-0-8 (4 credits)
Prerequisites: Permission of Instructor(s)
Usually offered: Fall and Spring
For information contact: Professor Alisha Sarang-Sieminski
NOTE: This is a registration option for non-Olin students.

This course incorporates formal, team-based, yearlong 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.

ENGR 4290
Affordable Design and Entrepreneurship (ADE)
Credits: 4 ENGR
Hours: 2-2-8
Prerequisites: AHSE 1500, ENGR 2210 and ENGR2250
Usually offered: Fall and Spring
For information contact: Professor Ben Linder

See description for ENGR 3290.

Mathematics

MTH 1111
Modeling and Simulation of the Physical World
Credits: 2 MTH
Hours: 3-0-3
Co-requisites: SCI 1111
Usually offered: Fall
For information contact: Professor John Geddes

See description in the Olin Introductory Experience (OIE) section

MTH 1120
Vector Calculus
Credits: 2 MTH
Hours: 2-0-4
Usually offered: Spring
For information contact: Professor John Geddes

An overview of differential and integral calculus in higher dimensions. Topics include surfaces, partial differentiation, gradients, multiple integrals, line integrals, Green’s, Divergence, and Stokes’ theorems, and their applications to science and engineering.

MTH 2110
Discrete Mathematics
Credits: 4 MTH
Hours: 4-0-8
Usually offered: Fall
For information contact: Professor Sarah Spence Adams

Topics for this course include combinatorics, number theory, graph theory, an emphasis on creative problem solving, and the ability to read and write rigorous proofs.

MTH 2120

Linear Algebra
Credits: 2 MTH
Hours: 2-0-4
Usually offered: Fall, Spring
For information contact: Professor Sarah Spence Adams

An introduction to the fundamental mathematical techniques and concepts used in solving linear systems of equations. Topics include matrices and vectors, Gaussian elimination, matrix inverses, transposes and factorizations, column, row, and nullspace of a matrix, rank of a matrix, determinants, and eigenvalues and eigenvectors.

MTH 2130
Probability and Statistics
Credits: 2 MTH
Hours: 2-0-4
Usually offered: Fall, Spring
For information contact: Professor Sarah Spence Adams

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.

MTH 2140
Differential Equations
Credits: 2 MTH
Hours: 2-0-4
Prerequisites: MTH 1120
Usually offered: Fall, Spring
For information contact: Professor John Geddes

An introduction to the solution techniques of differential equations. Topics include mathematical modeling, solution techniques to linear and nonlinear first-order differential equations, characteristic solutions to linear constant coefficient second-order differential equations, solutions to homogeneous (unforced) and inhomogeneous (forced) second-order linear systems. Applications include modeling of physical systems.

MTH 2160
Introduction to Mathematical Modeling
Credits: 2 MTH
Hours: 2-0-4
Prerequisites or Co-requisites: MTH 1111, MTH 2120,
MTH 2130, MTH 2140
Usually offered: Spring
For information contact: Professor John Geddes

This course centers on the interdependency of mathematics and the sciences and engineering. Through this codependency, knowledge of the specific discipline is better understood through the development of a mathematical description and its solution. Often, these descriptions are appropriate over a wide range of disciplines well beyond the original context of the first problem. Over the seven-week session, we look at individual cases in biology, chemistry, physics, fields of engineering and business to see how to formulate a mathematical description, and the techniques used for its solution. The course follows a case-study format, with modeling subjects chosen from the media (for example, the Science Times section of the New York Times).

MTH 3120
Partial Differential Equations
Credits: 4 MTH
Hours: 4-0-8
Prerequisites: MTH 2120 and MTH 2140
Usually offered: TBA
For information contact: Professor John Geddes

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 theinstructor(s), examples of which include systems of hyperbolic equations, similarity solutions in infinite domains, or a brief introduction to numerical solutions.

MTH 3130
Mathematical Analysis
Credits: 2 MTH
Hours: 2-0-4
Prerequisites: MTH 1120
Usually offered: TBA
For information contact: Professor John Geddes

An introduction to real analysis; construction of the real number system; metric spaces and metric topology; compactness; connectedness; functions. Emphasis on mathematical rigor, logic, and proof.

MTH 3140
Error Control Codes
Credits: 2 MTH
Hours: 4-0-8
Prerequisites: MTH 2120 (required), MTH 2110
or another proof based math class
Co-requisite: MTH 3140
Usually offered: Spring
For information contact: Professor Sarah Spence Adams

Error-control codes are used to detect and correct errors that occur when data are transmitted across a noisy channel. This course provides an introduction to error-control codes, including linear, cyclic, binary, and non-binary codes. Mathematics such as modular arithmetic and introductory ring and field theory will be introduced and used extensively. Students must simultaneously enroll in MTH 3140 and ENGR 3140 for a total of 4 credit hours.

MTH 3150
Numerical Methods and Scientific Computing
Credits: 4 MTH
Hours: 4-0-8
Prerequisites: MTH 2120, MTH 2140

Usually offered: TBA
For information contact: Professor John Geddes

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.

MTH 3160
Introduction to Complex Variables
Credits: 4 MTH
Hours: 4-0-8
Prerequisites: MTH 1120, MTH 2140
Usually offered: TBA
For information contact: Professor John Geddes

This course provides an introduction to the analysis of functions in the complex plane. Topics include the Cauchy-Riemann equations, conformal mapping, Cauchy-Goursat theorem, Taylor-Laurent series, the residue theorem, Nyquist criterion, continuation of analytic functions, and applications in science and engineering.

MTH 3170
Nonlinear Dynamics and Chaos
Credits: 4 MTH
Hours: 4-0-8
Prerequisite: MTH 2120, MTH 2140
Usually offered: Spring
For information contact: Professor John Geddes

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.

Science

SCI 1111
Modeling and Simulation of the Physical World
Credits: 2 SCI
Hours: 3-0-3

Co-requisites: MTH 1111
Usually offered: Fall
For information contact: Professor Mark Somerville

See description in the Olin Introductory Experience (OIE) section

SCI 1121
Electricity and Magnetism
Credits: 4 SCI
Hours: 4-0-8
Co-requisites: MTH 1120
Usually offered: Spring
For information contact: Professors Yevgeniya V. Zastavker, Rebecca Christianson and Mark Somerville

Electricity and magnetism, including electric charges, forces, and fields, Gauss's Law, potential, electrostatic energy and capacitors, magnetic fields and energy, mutual and self-induction, Ampere's Law, Maxwell's Equations and electromagnetic waves.

SCI 1130
Mechanics
Credits: 4 SCI
Hours: 3-3-6
Usually offered: Fall, Spring
For information contact: Professors Yevgeniya V. Zastavker and Rebecca Christianson

This course provides a thorough introduction to classical mechanics. We will cover kinematics, the basis of Newton's laws, particle dynamics, the concepts of momentum, work, energy, and rotational motion, and oscillations. Additionally, the course will establish the basics of solid and fluid mechanics, concluding with introductory topics in thermodynamics. Our goal is to share with you the excitement of discovering the material universe at its most basic levels and to equip you with the basic knowledge and analytical skills necessary to become a scientist or an engineer. This course is offered in two different flavors. Course sections with a prefix of A are taught as Theoretical Mechanics. Course sections with a prefix of B are taught as Experimental Mechanics and are laboratory based.

SCI 1210
Principles of Modern Biology (with laboratory)
Credits: 4 SCI
Hours: 4-3-5
Usually offered: Fall, Spring
For information contact: Professors Joanne Pratt and Jean Huang

This course introduces students to the fundamental aspects of biological science including biochemistry, molecular biology, human molecular genetics, and cellular communication. Students gain experience with contemporary research methods and scientific reasoning through laboratory experiments. The relevance of biology to the environment and health is emphasized.

SCI 1310
Introduction to Chemistry (with laboratory)
Credits: 4 SCI
Hours: 4-3-5

Usually offered: Spring
For information contact: Professor Chris Morse

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.

SCI 1410
Materials Science and Solid State Chemistry (with laboratory)
Credits: 4 SCI
Hours: 3-3-6
Usually offered: Fall, Spring
For information contact: Professors Jonathan Stolk and Debbie Chachra

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. The course is offered in four “flavors.” Each flavor has a different emphasis in some of the course projects, but all course flavors provide for significant student choice in project topics and experimental processes.

A. Historical Context (co-taught with AHSE 2110)
B. Environmental and Societal Impact of Materials
C. Biomaterials, Polymers and Mechanical Properties
D. Electrical and Magnetic Properties

Course flavors will be differentiated by the appropriate letter as a prefix to the section. The course number will be SCI 1410 for all versions.

SCI 2130
Modern Physics
Credits: 4 SCI
Hours: 4-0-8
Prerequisites: SCI 1121, or SCI 1130, or Permission of Instructor(s)
Usually offered: Fall
For information contact: Professor Stephen Holt

This course is an introduction to quantum physics. Although quantum physics is the most successful description of natural phenomena that has ever been devised, quantum “reality” is so intuitively frustrating that Nobel laureate Richard Feynman once famously said: “Nobody understands quantum mechanics!” The course material includes the origin and development of quantum mechanics and quantum statistics, with the goal of explaining the structure and characteristics of nuclei, atoms, molecules, fluids and solids (including semiconductors).

SCI 2140
Relativity

Credits: 2 SCI
Hours: 2-0-4
Usually offered: Fall (odd years)
For information contact: Professor Stephen Holt

When it was first introduced, Einstein's Special Theory of Relativity rocked the foundations of classical physics with a plethora of "paradoxes" that included twins who could have different biological ages. Like swimming, special relativity can be completely understood without formal physics prerequisites, and this course will be taught from first principles that do not require any specialized physics knowledge. This approach will naturally lead to an introduction of General Relativity, including some characteristics of Black Holes.

SCI 2145
High Energy Astrophysics
Credits: 2 SCI
Hours: 2-0-4
Prerequisites: SCI 1111
Usually offered: Fall (even years)
For information contact: Professor Stephen Holt

The universe is full of hot stuff! The oldest radiation that we can measure directly corresponds to temperatures of only thousands of degrees, but there is indirect evidence for the early universe requiring temperatures of trillions of degrees. As the universe expands and cools there are still occasional (but quite frequent) episodes involving temperatures of millions or even billions of degrees that are manifested in phenomena like supernovae and black holes. These high energy episodes are not just curiosities — supernovae are responsible for virtually all the chemical elements on Earth more massive than the very lightest, and giant black holes are present at the cores of virtually all galaxies. This course will examine how the theoretical and empirical study of X-rays and gamma-rays can probe the high energy universe.

SCI 2210
Immunology
Credits: 4 SCI
Hours: 4-0-8
Prerequisites: SCI 1210 or equivalent
Usually offered: Fall
For information contact: Professor Joanne Pratt

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 discussionbased 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.

SCI 2214
Microbial Diversity
Credits: 4 SCI
Hours: 3-3-6
Prerequisite: SCI 1210
Usually offered: Spring

For information contact: Professor Jean Huang

This course is an introduction to the tremendous diversity of the microbial world and its applications. Topics include: bacterial growth, energy metabolism, nutrient cycling, symbiosis, bioremediation, biofilm formation, and techniques for culturing and working with bacteria. This course approaches the study of environmental bacteria and their metabolic, physiological and genetic diversity through primary literature and laboratory work. Students will learn biochemical, molecular and bioinformatics techniques for working with microbial systems. Students will explore the microbial world first through guided laboratory exercises followed by development of individual and group special laboratory projects. Students will develop working knowledge of microbiology that may be applied to a range of situations, from study of systems where microbes are a problem to development of biological solutions using microbes.

SCI 2220
Biomechanics
Credits: 4 SCI
Hours: 4-0-8
Prerequisites: MTH 1111, MTH 1120, MTH 2120,
MTH 2140, SCI1130, SCI1210, or Permission of Instructor(s)
Usually offered: Spring (even years)
For information contact: Professor Yevgeniya V. Zastavker

Why is a giraffe’s head so small in comparison to the rest of its body? Why do babies’ heads flatten when they sleep in the same position? Why do knees bend only in one direction? Why are people taller in the morning? In this course, we will study the nature and function of human body and its movement with specific emphasis on movements produced in sport, dance, and every day physical activities. The principles of Newtonian mechanics, statics, and dynamics will be applied to discuss behavior of bones, tendons, ligaments, and muscles during human movement. This course is cross-listed as ENGR 2620.

SCI 2320
Organic Chemistry (with laboratory)
Credits: 4 SCI
Hours: 4-3-5
Usually offered: Fall
For information contact: Professor Chris Morse

An introduction to the fundamentals of organic chemistry with an emphasis on applications in biology, biotechnology, synthetic polymers, and the environment. Topics include structure and bonding in organic compounds; chemical and physical properties of organic molecules and bulk organic materials; reaction mechanisms and kinetics; structure-reactivity relationships; chemical and physical transformations; synthesis of organic molecules; and characterization techniques. It is strongly suggested that students who intend to take SCI 2320 first take Introduction to Chemistry, or an equivalent college level course.

SCI 3120
Solid State Physics
Credits: 4 SCI
Hours: 4-0-8
Prerequisite: SCI 2130
Usually offered: Alt Spring (odd years)

For information contact: Professor Rebecca Christianson

Why do metals conduct heat well while insulators do not? Why is silicon a better semiconductor than diamond, even though they have the same structure? Why is lead a good superconductor at low temperature, while copper is not? We will explore the current understanding of insulators, metals, semiconductors and superconductors through some of the basic tools of solid state physics, and will learn how to apply these tools to the novel materials being developed today. This course is cross-listed as ENGR 3812.

SCI 3130
Advanced Classical Mechanics
Credits: 4 SCI
Hours: 4-0-8
Prerequisite: SCI 1130, MTH 2120, MTH 2140
Usually offered: Alt Fall (even years)
For information contact: Professor Yevgeniya V. Zastavker

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.

SCI 3210
Molecular Genetics in the Age of Genomics
Credits: 4 SCI
Hours: 4-0-8
Prerequisites: SCI 1210 (Olin); BISC 219 (Wellesley); or Permission of Instructor(s)
Usually offered: Fall

For information contact: Professor Helen Donis-Keller It is now understood that many, if not the majority, of human disorders, including cancers, have an underlying genetic component. In this modern age of healthcare, we are expected to choose amongst an array of therapeutic options for ourselves and for our children rather than respond to specific directives from the medical establishment. In addition, we are called upon as voting citizens to make ethical decisions, e.g. the appropriateness of stem cell cloning. Therefore, it is in the interest of each person to learn more than the fundamentals of biology and genetics in order to make educated choices. In this course we will be concerned with the traditional concepts of human genetics including pedigree analysis, linkage mapping, Mendelian, multi-locus and complex traits, and genetic testing. However, for the most part, the course will view human genetics through a molecular lens. For example, the molecular basis of pathological conditions such as Huntington’s disease, hypercholesterolemia, Fragile-X and others will be examined in detail, as will gene imprinting and imprinting-related abnormalities (e.g. Angelman and Prader-Willi syndromes). Comparative genomics will be applied to the study of heritable traits in humans. The structure, function, and evolution of the sex chromosomes will also receive special attention. Gene therapy, cloning (stem cell, germ line) and the associated ethical issues will be considered in some depth. Students who are interested in bioengineering or medical school should find this course useful as well as those who have a general interest in the human as an organism.

SCI 3220
Bacteriophage Genomics Research Project Laboratory

Credits: 4 SCI
Hours: 2-2-4
Usually offered: Fall or Spring
Prerequisites: SCI1210
For information contact: Professor Helen Donis-Keller

The process of discovery in biology must be experienced, not simply read about in a textbook, in order for one to fully appreciate what it takes to do science and how it feels to discover something not previously known. Bacteriophages (viruses of bacteria) are particularly interesting and relevant subjects for study because they constitute the majority of all biological entities. An estimated 1031 tailed phages inhabit the planet earth! Knowledge of phages and their host bacteria is important from a public health perspective and phages present an opportunity for study of bioengineering organisms. This hands-on course provides a guided primary research experience in the isolation, purification, characterization, and sequence annotation of bacteriophages of M. smegmatis. Purified viruses, named by their discoverers, will be investigated by a variety of means including Transmission Electron Microscopy (TEM) and DNA sequencing of their entire genomes. Students in this course will gain experience with the fields of genomics and bioinformatics from the analysis of new phage genomes. Putative new genes will be identified and compared with those from similar organisms in order to better understand the extent of diversity and evolution of mycobacteriophages. Weekly journal club discussions including visits by seminar speakers enhance understanding of phage biology and genomics.

SCI 3250
Biological Thermodynamics
Credits: 4 SCI
Hours: 4-0-8
Prerequisites: MTH 1111, MTH 1120, MTH 2120,
MTH 2140, SCI1130, SCI1210, or Permission of Instructor(s)
Usually offered: Spring (odd years)
For information contact: Professors Yevgeniya V. Zastavker and Alisha Sarang-Sieminski

The beauty and depth of this subject cannot be described better than with the words of one of the greatest physicists of the 20th century, Arnold Sommerfeld, ‘’Thermodynamics is a funny subject. The first time you go through it, you don’t understand it at all. The second time you go through it, you think you understand it, except for one or two points. The third time you go through it, you know you don’t understand it, but by that time you are so used to the subject, it doesn’t bother you anymore’’. In this course we will venture into the depths of thermodynamics and statistical mechanics, while concentrating on applications of the abstract concepts to biological, biochemical, and biophysical phenomena and drawing from contemporary bioengineering problems. This course provides an introduction to the study of energy transformations in biological systems as well as thermodynamics and kinetics of structure formation and association of biomolecules. Topics covered include energy and its transformation, the First and Second Law of Thermodynamics, Gibbs Free Energy, statistical thermodynamics, binding equilibria and reaction kinetics, and a survey of other interesting areas of biological thermodynamics, particularly the origin of life on Earth. Topics have relevance to numerous pertinent biological/ bioengineering applications including diseases based on phase transitions (e.g., cataract of the eye, Alzheimer’s disease, etc.), oxygenation of hemoglobin; protein folding, aggregation, and binding; assembly of everything from the phospholipids bilayer to biomaterials; the macroscopic mechanical properties of biomaterials and even cells; creation and operation of devices at the nano- and micro-scales; understanding the basis of mass transport; osmotic pressure relevant to cells and microvascular filtration; receptor-ligand binding; the melting and annealing of DNA. The concepts employed in this course have relevance to students interested in many disciplines, including

Bioengineering, Materials Science, Biology and Chemistry. This course is cross-listed as ENGR 3650.

SCI 3320
Organic Chemistry II (with laboratory)
Credits: 4 SCI
Hours: 4-4-4
Prerequisites: SCI 2320
Usually offered: Spring
For information contact: Professor Chris Morse

After undertaking the introductory course in organic chemistry, students will be able to learn more advanced topics and master the reactions of the more biologically-relevant functional groups. Some of the topics this will include are sugars and carbohydrates, the chemistry of enolates and carbonyls, advanced NMR techniques, and pericyclic reactions. At the end of the course, there will be an introduction to biochemistry from an organic perspective. This course will culminate in a large organic laboratory synthesis that the students will develop and plan themselves for half of the semester.

SUST 2201: Introduction to Sustainability
Credits: 4 SUST
Hours: 4-0-8
Prerequisites: sophomore and/or junior standing; first years by permission
Usually Offered: Fall
For Information contact: Professor Benjamin Linder

This case-based course introduces students to the basic concepts and tools that business, engineering, and the liberal arts (science, social science, and the humanities) bring to a consideration of sustainability. It is team-taught by three faculty members, one from each institution, with coursework fully integrated across the three approaches. The course will draw empirical material from, and apply concepts and tools, to the sustainability of a city block.

SUST 3301: Sustainability Synthesis
Credits: 4 SUST
Hours: 4-0-8
Prerequisites: declared participation in the Sustainability Certificate,
SUST 2201, completion of 3 of the 4 elective courses for the certificate.
Usually Offered: Spring
For Information contact: Professor Benjamin Linder

This project-based course provides students with a chance to apply and integrate the concepts and the tools of business, engineering, and the liberal arts (science, social science, and the humanities) to address sustainability. It is team-taught by three faculty members, one from each institution, with coursework fully integrated across the three approaches. Students will work in multi-campus groups on a project with a client throughout the semester, along with common readings and discussions about processes and project stages taking place in class time.

Academic Policies

One of Olin’s highest priorities is the well-being of its students, and Olin recognizes that individual circumstances often call for individual approaches. Olin's faculty, staff, and administration will always attempt to do what is right, regardless of the formal rule. The following policies will help to ensure that students are treated fairly.

Attendance Policy

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. The Dean of Student Life will grant exceptions for illness, religious observance, or other reasons deemed appropriate.

Olin Exposition

The Olin Exposition is a public event at the end of each semester where students present academic and non-academic work to an audience that includes the entire Olin community and external visitors. It is an opportunity for students to reflect on the semester, celebrate their achievements and share them with others, practice communication skills, and demonstrate their activities and abilities.

Expo is an opportunity for people outside the college to see what Olin students can do, and it is an important way of involving external constituencies in the activities of the school. Faculty, staff, students and external visitors are asked to evaluate student presentations as a way of helping students improve and also as a way of evaluating our programs. Normally all registered students are required to participate in Expo, both as presenters and as evaluators. Students who cannot attend Expo for any reason should petition the Dean of Student Life as early as possible for an excused absence. Failure to participate in Expo is noted by the faculty Expo Coordinator. Persistent failure to participate without an excused absence may be considered a violation of the Honor Code, particularly regarding Passion for the Welfare of the College.

Definition of Full-Time Status

Enrollment at Olin College is for full-time study in engineering. Students are expected to follow the curriculum design for each class year and carry a usual load of 16 degree credits. The definition of full-time study is a minimum of 12 attempted degree credits each semester with a maximum of 20 attempted degree credits each semester.

Part-time study is generally not available at Olin College; however, special cases will be considered by the Assistant Dean of Student Life for Advising.

Course Overload Policy

Olin students may register for a maximum of 20 credits each semester. The maximum load of 20 credits is a total of degree and non-degree activities. In exceptional circumstances, students may petition the Committee on Student Academic Performance (COSAP) with the consent of their adviser for approval of a course overload. This reflects Olin's commitment to reasonable expectations. First-year, first-semester students are limited to taking a maximum of 18 credits.

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.

Class	Earned Degree Credits
First-Year	0-30
Sophomore	31-60
Junior	61-90
Senior	>90

Declaration of Major/Change of Major

Students are expected to declare their major no later than the time of registration for the fourth semester. Major declaration forms are available at the Student Accounts and Records Center (StAR) website (http://star.olin.edu) and must be signed by the student and his or her adviser.

Students declaring the Engineering major must also complete and submit a major course planning form at the same time. The instructions and form can also be found on the StAR website.

Change of majors can be submitted using a declaration of major form and a major course planning form (if appropriate). Students who change their major should be aware of their remaining degree requirements. Additionally, they are responsible for tuition, room/board and fees for any semesters beyond the eight covered by the Olin scholarship.

Registration

Prior to each semester, there will be a designated registration period in which students will speak with their advisers and make choices for course selection. 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 a minimum enrollment to be offered.

Cross-Registration Policy

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 in the natural and mathematical sciences, arts, humanities, social sciences and business.

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. Normally, 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, but may petition the Course Substitution and Transfer Board (CSTB) for an exception to this rule. With prior approval from the CSTB, students may use courses taken at the BBW schools to satisfy general course requirements, distribution requirements, and program specific course requirements.

Students are responsible for all deadlines and registration procedures related to the host school. Information regarding procedures for cross registration is provided in the semesters' registration booklet. 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.

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. Paper requests may also be processed at the StAR Center during these 10 days. Discussions between students and their advisers are strongly suggested. 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.

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 during this period must be made in person at the StAR Center and require the appropriate instructing faculty signature and the student adviser signature.

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 adviser. Students must then process the course withdrawal at the Student Accounts and Records Center. 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 adviser to determine how the credits, and/or requirement will be completed in the future. Olin students crossregistered at one of the BBW schools must follow the academic policy on course withdrawals for the host school.

Half-Semester Courses

The Add, Drop and Course Withdrawal periods are prorated for half semester courses. The Add Period is the first five 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.

Grading at Olin

Philosophy

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. The Dean of Faculty will annually conduct a review of grade distributions and grading procedures.

Grading Rules and Regulations

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.

3. 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, she or he will issue a notice of academic concern in a timely manner. Copies of this notice will be sent to the student, the student's faculty adviser, and the Assistant Dean of Student Life for Advising.

4. End of Semester Feedback to the Adviser: Olin advisers have real-time access to advisees' course grades through the Student Information System. In addition, instructors will notify advisers of any significant concerns noted during the semester.

5. Pass/No Record First Semester: In the first semester, first-year, Olin instructors may report the student's grade to the student and to the adviser, but will report only a grade of Pass (P) or No Record (NR) to the Registrar. A grade of No Record does not affect the student's GPA. In subsequent semesters, Olin instructors will report the student's final course grade, according to the scale outlined below, to the Registrar.

6. Course Grades: Course grades at Olin provide students, their advisers, potential employers and graduate schools information about overall performance. Course grades are determined based upon a mix of demonstrated comprehension, skill, participation, and effort.

7. 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:

Grade	Assessment Description	Point Value
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
D+		1.3
D	Poor	1.0
EG	Experimental Grading	n/a
F	Failing	0.0
I	Incomplete (temporary grade)	n/a
IF	Incomplete Failing	0.0
IL	Incomplete/Leave of Absence (temporary grade)	n/a
IP	In Progress	n/a
L/NR	Leave/No Record	n/a
NC	No Credit for Pass/No Credit Option	n/a
NG	No Grade Reported By Instructor (temporary grade)	n/a
NPP	No Passionate Pursuit Recognition	n/a
NR	No Record	n/a
P	Pass	n/a
PP	Passionate Pursuit Recognition	n/a
R	Course Repeated	n/a

TR	Transfer Credit	n/a
W	Withdrew from Course	n/a

8.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).

9. Repeated Courses: If a student retakes a course 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. Repeated courses may be used in Financial Aid Satisfactory Academic Progress Pace of Progression calculations.

10. 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.

11. 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, he or she cannot revert back to receive a letter grade.

12. Passionate Pursuits (including Research as Passionate Pursuit): 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. In exceptional cases, the faculty supervisor may include an official letter of commendation in the student’s file. This commendation letter will be available to external parties.

13. 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.

14. 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.

Honor Code

It is expected that students will behave with integrity and according to the Honor Code; see page 73.

Incomplete Policy

In extenuating circumstances, a student may request an Incomplete (I) grade by petitioning the Dean of Student Life. If an Incomplete grade is approved, the student will be granted an extension period to complete the coursework. The period of the extension will be determined by the Dean of Student Life. 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 and the Dean of Faculty. An IF grade does affect a grade point average. An Incomplete 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).

An Incomplete will not 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 adviser.

Extra Help

For all courses, faculty members provide extra help for students as appropriate. In addition, individual tutors are assigned by the Office of Student Life. Students who feel that individual tutoring would be helpful to them should contact the Assistant Dean of Student Life for Advising as early in the semester as the need becomes apparent.

Grade Change Policy

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 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 Dean of Faculty. After one calendar year (from the end of the original grading period), all grades are final. All grade changes must be made in writing and signed by the Dean of Faculty.

Final Exam Policy for Excused Absences

Students who are unable to take their final exams for legitimate reasons and wish to request a makeup exam generally must obtain advance authorization from the instructing faculty members and the Office of Student Life. In the event that advance authorization cannot be obtained due to extenuating circumstances, students should contact the Office of Student Life and the instructor(s) as soon as they are able. If the exam 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.

Graduation

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.

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 the retention and graduation rates. The retention rate, defined as the number of first year students who return in the following fall semester, is 92% for the 2010 cohort of new students.

The graduation rate is defined as the percentage of students who complete their degree program within 150 percent of the normal completion time for that degree. For Olin College, this means the percentage of entering students who complete their degree within six years. For the 2006 entering class, the graduation rate is 94%.

Additional information is available from the Office of the Registrar.

Academic Recommendation Board

The Academic Recommendation Board (ARB) has the responsibility to foster change and act as a steward of the curriculum. The ARB regularly reviews the curricular structure and course options and reviews and authorizes changes in degree requirements. Students may petition the ARB if they need to apply for an exception to graduation requirements.

The Course Substitution and Transfer Board

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. For more information on transferring credit, see Transfer Credit section.

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; a list of these courses is posted on the StAR website (http://star.olin.edu/forms). 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.

Committee on Student Academic Performance

The Committee on Student Academic Performance (COSAP) is charged by the Dean of Student Life and is empowered to review, interpret, and propose academic performance policies. This committee considers petitions to waive existing academic performance regulations and acts as an appellate body for students with academic performance grievances. The committee also examines the records of students who are not making satisfactory progress toward a degree.

This committee is chaired by the Dean of Student Life or the Dean's designee (non-voting, except in the case of a tie) and consists of the Registrar (non-voting), the Assistant Dean of Student Life for Advising, and three faculty members. Students wishing to appeal a decision on policy must submit their appeal to the Registrar within one week of the original decision.

COSAP also reviews student petitions for exceptions to policy. The twenty credit maximum course load policy is a typical example of a petition to COSAP. There is no form to complete. Interested students should discuss their course load with their adviser and then write a detailed petition that outlines the rationale. The petition is then sent to the COSAP convener, Linda Canavan. Students should include their adviser on the email to the COSAP convener, as the adviser is always asked for feedback.

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.

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.

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 will be transferable to Olin only if approval is obtained from the CSTB prior to enrollment in each course.

Program Group Recommendations

The Program Groups (ECE, ME, E) will periodically review the progress of every student with a declared major. The program groups will work with students and their faculty adviser if performance in program specific course requirements is unsatisfactory or if trends indicate that such performance may become unsatisfactory.

College Withdrawal Policy

At times, the Dean of Student Life (or his/her designee) may require a student to withdraw from Olin College for academic or any other reasons, without following Honor Code procedures. Students who are required to withdraw may not reenroll at Olin without written approval from the Office of Student Life.

Students may wish to leave Olin College prior to completing their degree. Such a decision may be difficult to make. Therefore, we encourage students to discuss the situation with their faculty adviser and the Assistant Dean of Student Life for Advising. A student should consider whether a Leave of Absence might provide a more suitable means for them to address the underlying circumstances for the withdrawal. The student’s decision to withdraw indicates she or he does not intend to return. Students who need a leave of absence should follow the procedures described below for requesting a leave. 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.

Voluntary Withdrawal

Students can voluntarily withdraw from Olin College. Students must file a College Withdrawal Form with the Assistant Dean of Student Life for Advising. Withdrawing for nonmedical reasons during a semester will yield a grade of W, Withdrew, 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.

Medical Withdrawal

Students who need to withdraw from Olin College for medical reasons should complete a College Withdrawal Form with the Assistant Dean of Student Life for Advising. If a student intends to return to the college, he or she should follow the procedure outlined in the Leave of Absence policy. Medical Withdrawals during a semester (i.e., 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 in these circumstances to a full or partial refund of certain expenses and fees according to the guidelines of the college's refund policy.

Medical documentation may be required to complete the process.

Return Following Withdrawal

Each request for readmission after withdrawal (required, voluntary, medical or administrative) is assessed on its individual merits; as such, readmission requirements will vary. Written approval from the Office of Student Life is required for readmission.

Leave of Absence Policy

Students in good academic standing may request a leave of absence for up to 180 days in any 12-month period. Leaves of absence may not be used for study away. To initiate a leave of absence, students should meet with their adviser and complete a Leave of Absence Form. The request is then forwarded to the Assistant Dean of Student Life for Advising for approval. Documentation of the reason for the leave of absence (medical or otherwise) should accompany the request for a leave. The request, when approved, and any accompanying documentation will be forwarded to the Registrar for processing and placed in the student's academic file.

The deadline for applications is the Monday prior to the start of course registration for the subsequent semester.

When a Leave of Absence 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 Life within two weeks of the date of the denial of leave. There are two kinds of leaves:

1. 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 adviser.

* 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 Final Exam Policy for Excused Absences.

2. A Leave of Absence Between Semesters: This type of leave is requested when a semester is not in active session and there is a circumstance that impacts the student's ability to continue in the next semester. 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.

Return from Leave or Withdrawal

Students wishing to return from a leave of absence, voluntary withdrawal or medical withdrawal from the college should contact the Office of Student Life.

Study Away Program

One of the founding principles of Olin College was that each student should have the opportunity to have a learning experience "away" from the college. This ideal was articulated early in the creation of the college with the expressed objective of having students learn to be citizens of the world.

The Olin Away Program was created to deliver on this principle, and provide students with the opportunity to broaden their perspective and views of the world. Students in their junior year can choose among three types of away experiences: a Direct Exchange Program, a Pre-Approved Program, or a Student-Designed Program. Financial assistance may be available to eligible students. Contact the Financial Aid Office for additional information regarding eligibility and procedures. For additional information please visit: https://www.olin.edu/study_away/overview.aspx.

Transfer Credit

Olin College generally does not accept transfer credit for incoming students, but 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.

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: In general, Olin does not accept transfer credit from Community Colleges. On-line courses may be accepted provided that items 1 and 2 above are fulfilled. Pre-approval forms can be found at: http://star.olin.edu.

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 (B- or equivalent) requirement for transfer, the course and the credits will appear on the student's Olin transcript. Although the grade does not 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. Although, not listed on a transcript, the credits will also be included as attempted in the pace of progression calculation for financial aid satisfactory academic progress. See the financial aid section for more details.

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.

Special Accommodations Policy

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. The Office of Student Life coordinates services for students with learning disabilities, sensory impairments, psychological disabilities, and medical conditions.

Students are responsible for identifying themselves to the Assistant Dean of Student Life for Advising and providing appropriate documentation of their disability and need for accommodation in a timely manner. Students requesting accommodation should contact the Assistant Dean of Student Life for Advising as soon as possible after matriculation. Services for students with learning disabilities may include, but are not limited to, academic accommodations, coaching on organizational and time management skills, faculty notification, 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, and on information from a medical care provider concerning the student's disability and related needs.