"Once Upon a College"

or

The Olin College Curriculum

(A Play in Five Acts)

by The Curricular Decision Making Board

Franklin W. Olin College of Engineering

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Prologue: The Elevator Talk

Scene: An elevator in an unspecified academic institution. Two people are in the elevator: Hamlet, an Olin faculty member; and Ophelia, a faculty member at the institution where the scene takes place.

Ophelia: So you're at Olin now. Are you happy with the curriculum you've put together?

Hamlet: You'd better believe it! After doing a lot of research and holding more brainstorming sessions than I'd ever thought possible, we finally have something that really makes a powerful statement. What did you think of our huge curriculum document – "Once Upon a College?"

Ophelia: Well, umm, I guess I didn't read it. Do you have a quick "big picture" summary?

Hamlet: The big picture? I'd have to say that we want students to learn about engineering *in context*. That means students and faculty will connect engineering to the real world, where business, politics, cultural considerations, and aesthetics matter. Our engineers will be effective communicators, will appreciate ethical issues, and will consider the societal influences and impacts of their work. Engineering also has to *physically* connect to the real world – we think students should build "stuff" as soon as possible, rather wait until they learn two years of theory before getting to anything real. Finally, we're trying to make connections *between* engineering content areas – we want students to understand how seemingly disparate subjects relate to each other. I don't know about you, but when I took differential equations, I had no clue why they were making me learn it. At Olin, we'll teach differential equations in the context of fascinating mechanical and electrical projects and examples.

Ophelia: I guess your rhetoric sounds good…

Hamlet: OK, so those are some glowing generalities. Let me give you a bit more detail.

In their first year, we want students not only to understand but also to apply the basic physical and mathematical foundations of engineering. We achieve this by combining scientific and technical content with substantial projects that introduce students to engineering by letting them design and build something real. These projects help support the theory and also develop students' toolbox for future

projects via a number of short, context-driven courses in specific engineering and entrepreneurship skills (e.g., opportunity assessment or CAD) and through an emphasis on design and communication. We also develop fundamental competencies in what we like to call the "AHS" – arts, humanities, and social sciences – through a student-designed sequence of courses in this first year. Students bring all of this together by writing a reflective learning plan that spells out their personalized educational goals and the contributions of their various activities.

In year two, students deepen their command of business and AHS through course work that closely coordinates with a technical project. This project broadens students' perspectives on science and engineering. The really cool thing is that students get to apply the various skills they've developed in projects when they propose and complete an open-ended, self-conceived and self-directed sophomore design project that serves as an exciting culmination for the first two years.

Our approach to teaching in these two years is also different. Many schools talk about the importance of teamwork, but at Olin we try to "walk the walk." Major portions of the first two years are taught in coordinated "cohorts," in which three faculty members work together to develop synchronized courses that really support a hands-on project. These cohorts allow us to track students better, lead to better learning, foster integration of content and applications, and allow for some real innovation in delivery and projects.

The final two years of the curriculum are still being discussed – we have some ideas about what it will look like but our decisions will certainly be informed by what we learn this year and next. We imagine that students will complete multi-disciplinary specialization projects that team up students with different perspectives and skill sets – maybe two MEs and a CEE working together on a MEMs project. We also want to accommodate the option for both international and industrial experience in this year. In any case, by the time students are seniors, they'll be doing the real engineering on their own, in a year-long capstone project that will look very much like professional practice.

Ophelia: Boy, this sure is a slow elevator.

ACT ONE: About This Document

We know what we are,
But know not what we may be

Hamlet, Act IV Scene V.

Welcome to the Olin Curriculum.

This document describes the Olin curriculum, as it will be implemented in the fall of 2002. Within this curriculum, Olin combines best practices from many other institutions with new ideas and approaches. The development of this curriculum has a rich and interesting history, which we invite you to read in the paragraphs that follow. We will also explain our "big-picture" philosophy as well as the "nitty gritty" details surrounding our implementation strategies.

Over the last twenty years, the National Science Foundation and the engineering community have called for sweeping structural and cultural changes in engineering education, including:

- A shift from disciplinary thinking to interdisciplinary approaches;
- Increased development of teaming skills;
- Greater consideration of the social, environmental, business, and political context of engineering;
- Improved student capacity for life-long learning; and
- Emphasis on engineering practice and design throughout the curriculum.

The Franklin W. Olin Foundation enthusiastically responded to this call in 1997. Committing in excess of $300 million, the Foundation created the Franklin W. Olin College of Engineering, an entirely new undergraduate institution dedicated to preparing 21st century technological leaders. As a first step, the Foundation designed and constructed a high-tech campus in Needham, Massachusetts. A top-notch management team and world-class faculty then spent two years investigating worldwide engineering education strategies. Over the 2001-2002 year, the "Olin Partners", thirty of the brightest college applicants in the U.S., joined in this work of developing an innovative curriculum and campus culture. You are now holding one of the first results from all of this labor.

Before we get to the fun stuff we would like to raise two important issues. First, this is a work in progress. We cannot emphasize this enough. **You must not interpret any of the ideas or procedures within this curriculum as final or binding**. Olin's faculty, students, and staff embrace the ideal of continuous improvement, and we have learned to expect change. Although we often feel that we are in the final stages of the college-building process, Winston Churchill's words offer an important perspective: "This is not the end. It is

not even the beginning of the end. But it is, perhaps, the end of the beginning." We have reached the implementation stage of this experiment, and we will certainly learn quite a bit in the weeks and years ahead.

Second, by reading this, you are becoming a member of the broader Olin community – the "Olin family," if you will. We would love to hear any feedback you might have, particularly constructive criticism or innovative ideas (see the "Epilogue" for your specific charge). At the same time, **we must ask you to refrain from distributing this document**. As a work in progress we would like to "keep it within the family" until it takes on a more final form.

Thank you for your indulgence – on with the show!

ACT TWO: Curriculum Overview

Season your admiration for awhile
With an attent ear, till I may deliver,
Upon the witness of these gentlemen,
This marvel to you.

Hamlet, Act I Scene II.

Curricular Philosophy

The founding principle of Olin College of Engineering is to prepare leaders able to predict, create and manage the technologies of the future. Students who will become such leaders must have:

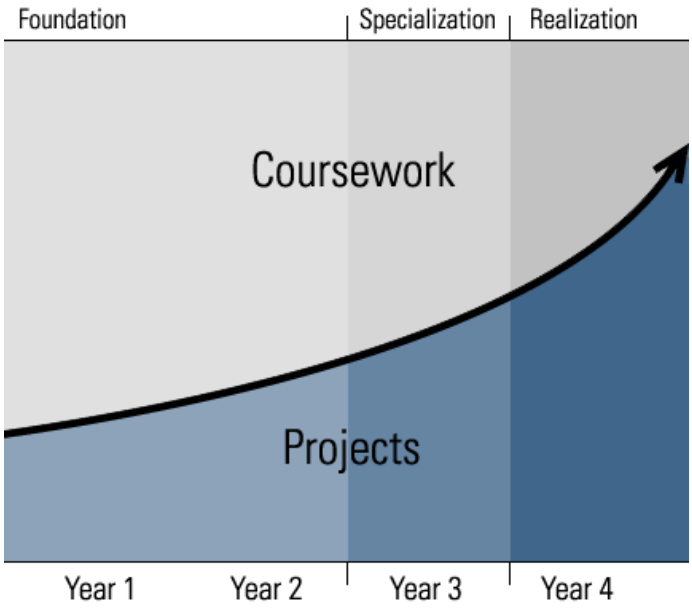
- A superb command of **engineering fundamentals** and **specialized knowledge in field of major**;
- A broad **perspective** regarding the role of engineering in society;
- The **creativity** to envision new solutions to the world's problems; and
- The **entrepreneurial skills** to bring their visions into reality.

The Olin Curriculum addresses these outcomes. Rigorous technical courses and hands-on projects (occupying from 20% to 60% of student time each semester) throughout the curriculum require students to apply engineering concepts to actual, practical problems. Interdisciplinary courses and projects make explicit the connections both within the technical world and between engineering and society. Extensive design experiences, significant work in the arts and humanities, and an emphasis on original expression encourage students to develop and to apply their creativity. Continuous use of teamwork, communication skills, and entrepreneurial thinking give students the tools they need to take their solutions from the research lab to the world at large.

As shown in Figure 1, the Olin curriculum consists of three phases: *foundation*, which emphasizes mastering and applying technical fundamentals in substantial engineering projects; *specialization*, in which students develop and apply in-depth knowledge in their chosen fields; and *realization*, in which students bring their education to bear on problems approaching professional practice. In all three phases of the curriculum, students are engaged in interdisciplinary engineering projects that require them to put theory into practice, to put engineering in context, and to develop teaming and management skills. As a student progresses, these projects become increasingly open-ended and authentic.

Students have significant flexibility in charting their path through the curriculum, but all students are responsible for demonstrating mastery of required material through regular assessment.

Figure 1: *Structure of the Olin curriculum. Projects are present in all four years, and occupy an increasing proportion of student effort.*



Organization and Scope

The Olin Curriculum presents a coherent and complete vision of a two year foundation, with a less detailed example for the specialization and realization years. Prominent features of the foundation include:

- Cohorts, or integrated combinations of courses and projects
- Non-cohorted projects and courses (including free electives)
- A sophomore design project
- Gates, or end of year assessment activities
- Learning plans, or student-written documents used to shape one's education
- Passionate Pursuits, or extracurricular activities undertaken for non-degree credit
- Research
- Independent study

The main (pre-Appendix) body of this document addresses structural issues. For example, we define the curricular building blocks in the following section, illustrate how they fit

together, and address implementation issues. This text is basically a blueprint for academic operations. In effect, the curriculum defines the specific educational activities that will take place, the sequence of these activities, how they relate to one another, and their "big picture" purpose. These guidlines are broad enough to allow tremendous flexibility on the part of instructors as well as an excellent range of student choice.

ACT THREE: "The Foundation"

How now, Horatio! you tremble and look pale:
Is not this something more than fantasy?
What think you on't?

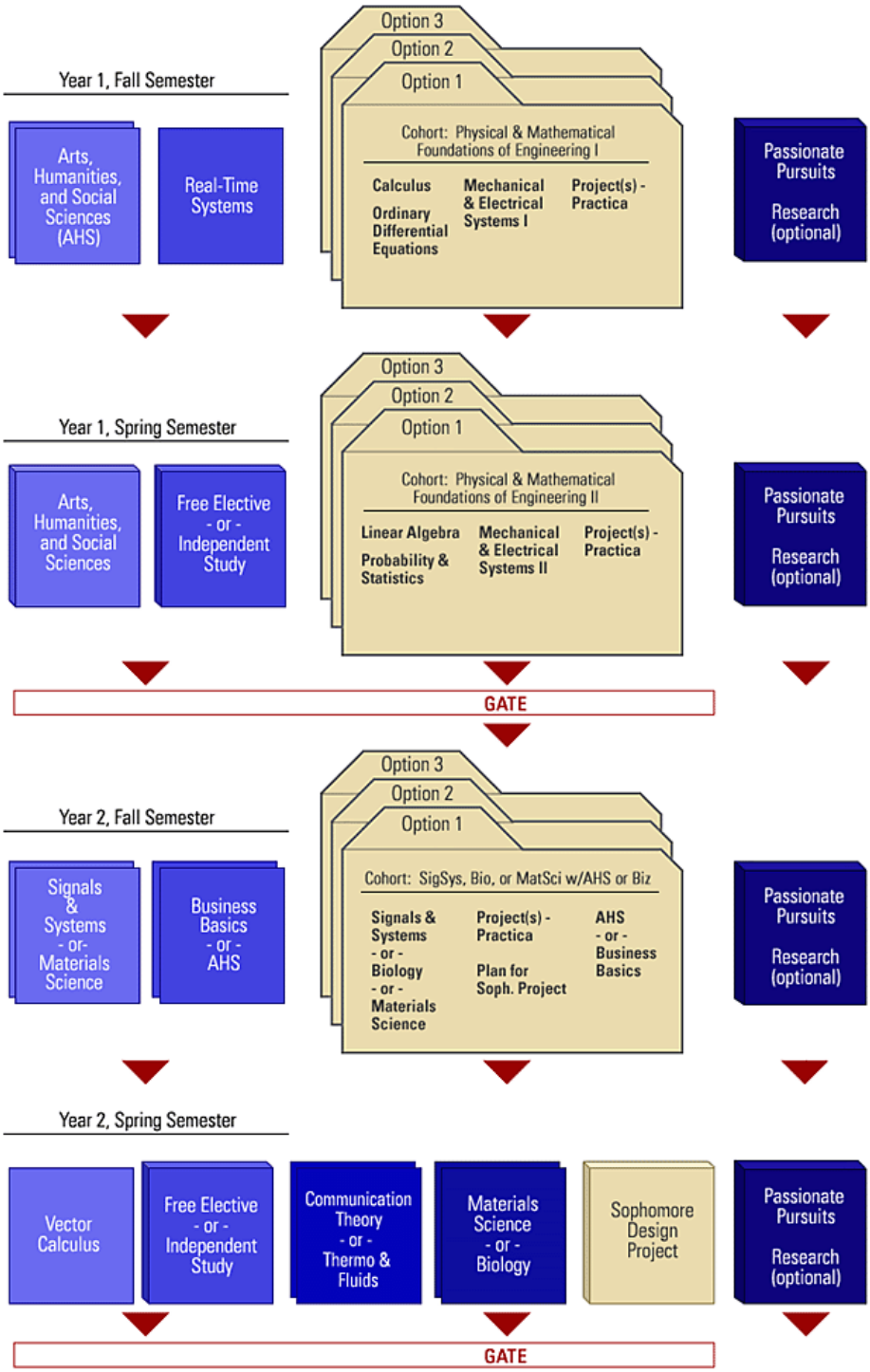
Hamlet, Act I, Scene I.

Basic Foundation Description

Figure 2 (see next page) illustrates the basic structure and requirements of the Olin Foundation curriculum. The Foundation is a two-year period emphasizing a broad base of engineering fundamentals and the application of these fundamentals in realistic engineering projects. Students are encouraged to select a major area of specialization prior to the end of the third semester but are not required to do so until the end of the foundation.

Different components of the foundation are described on the page following Figure 2. The "Frequently Asked Questions" provide additional detail.

Figure 2: *Illustration of the foundation.*



Foundation Components

Cohorts

Throughout the first three semesters the key feature in this curriculum is an interdisciplinary project run in conjunction with two disciplinary courses. This block of material, the equivalent of two content courses and one project course, will be referred to as a **cohort**. These cohorts are designed for tight coordination between the understanding of underlying disciplines and the application of this disciplinary knowledge to real engineering problems. Freshman year cohorts all combine two mathematical topics (for example, Calculus and Ordinary Differential Equations) with a physics-like course exploring Mechanical and Electrical Systems.

The second year cohort in the fall semester integrates scientific courses with the **Arts, Humanities, and Social Sciences (AHS)** and **Entrepreneurship**, allowing students to work on engineering projects that have broader implications than the purely technical. Sophomore students have three cohort options in their first semester that might include combinations such as Biology & AHS, Materials Science & AHS, or Signals and Systems & Business Basics.[1] Regardless of their cohort assignment, all students will cover the same content areas by the end of the sophomore year. Students selecting a Materials Science and AHS cohort, for example, must simultaneously take Business Basics and Signals and Systems courses outside of the cohort, and a Biology course in the following semester.

The spring semester in year two does not contain any cohorts.

Other Courses

In addition to the cohort blocks, Figure 2 lists stand-alone foundation curriculum course requirements such as real time systems, vector calculus, or a sequence of AHS courses offered at Olin and Babson. The free elective noted in the spring semester of each year is completely unrestricted and might refer to a semester-long activity or a set of two quamester (half-semester) courses. The second year also includes technical courses that begin exposing students to different disciplinary tracks: Mechanical, Electrical and Computer, and General Engineering. Again, students need not select a major before the end of the sophomore year.

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[1] These three examples – Biology & AHS, Materials Science & AHS, or Signals and Systems & Business Basics – constitute a subset of the six possible combinations of sophomore year technical (Biology, Materials Science, Signals and Systems) and non-technical (AHS, Business Basics) offerings. The other combinations (Biology & Business Basics, Materials Science & Business Basics, and Signals and Systems & AHS) are perfectly viable as well. As a thought exercise, see if you can envision creative interdisciplinary projects for all of these combinations.

Sophomore Design Project

Another prominent feature of the curriculum is the **Sophomore Design Project** occurring in the second semester of the sophomore year, the only foundation semester without cohorts. Students will apply basic skills learned throughout the first three semesters and illustrate their competence in the field of technical design. Planning (i.e., team formation and proposal writing) for this design project begins in the first semester of the sophomore year. This offers a significant opportunity for students to conceive an idea and bring it to fruition.

Gates

Students are required to pass a **Gate** at the end of each year. Gates ensure that students have met the learning objectives for the year (each course is designed around a series of learning objectives that will be distributed to students at the outset). Additionally Gates force students to synthesize material across many disciplines and expose students to more realistic assessment (e.g., oral examinations, team laboratory exercises, etc.) than typical course based assessments.

Passionate Pursuits and Research

Students at Olin are encouraged to undertake non-degree credit activities known as **passionate pursuits**. Olin implemented this program to recognize that students have areas that they are quite passionate about – some in technical areas, some in artistic areas, etc. – and that these areas play a role in a student's personal and professional education. Olin gives students the opportunity to pursue these passions by providing resources and non-degree credit.

Student research is also included in this category because students cannot receive non-degree credit for research and passionate pursuits at the same time.

Passionate pursuits and research are described in more detail in the Appendix.

Frequently Asked Questions:

So I'm a new student. What do I have to take in my first year?

In fall registration you will sign up for an AHS foundation course (from a choice of two), a computing course, and a cohort in Mathematical and Physical Foundations of Engineering I (from three different options). These activities last for one semester.

In the spring, you will again sign up for 1 semester of AHS (a much broader choice of courses) and a cohort in Mathematical and Physical Foundations of Engineering II (from 3 choices). You also have one completely unrestricted semester-long elective in the spring.

What? It sounds like I only get one choice in my first year, and not many in my second year!

No, you actually have quite a bit of choice, especially in comparison to most engineering programs:

- **AHS:** You may select one of two Babson Liberal Arts Foundation options in the fall: "Arts and Humanities" or "History and Society," as well as an Olin foundation offering. And then we get to the spring, the glorious, choice-filled spring. Olin students can choose from a significant number of courses including Babson Liberal Arts foundation or intermediate course offerings, "intermediate" level Olin AHS offerings, and possibly from courses at Wellesley and Brandeis.

- **Cohort:** You can choose between three available cohorts in each of the first three semesters, and cohort selection in one semester does not constrain future cohort choices. All first year cohorts cover the same fundamental material but differ significantly in their projects and pedagogical approaches. Sophomore year cohorts do not cover the same material: cohorts might combine biology and AHS (e.g., a project on cloning and its ethical implications); materials science and AHS (e.g., a reconstruction of Paul Revere's rolling mill); and a signals and systems and business (e.g., product design of a circuit board), or other combinations of these offerings.

- **Free Elective(s):** You will have one open elective in the spring semester of **every** year, which you can use to pursue any topic of interest. This elective covers a three-unit time block, which could result in one semester long class or two quamester activities. Electives offered at Olin might include offerings that mix science and AHS (e.g., "Seeing & Hearing," "Leonardo DaVinci: Artist, Scientist, & Engineer," "Physics, Ethics, and the Bomb," "Technology and the Environment") or technical courses (e.g., Computer Science, Quantum Physics). Students are also welcome to participate in courses at Babson, Wellesley, or Brandeis.

- **Sophomore Design Project:** In the spring of your second year you will form a student team and work together to design and implement a product of your own

conception. Although all students must complete such a project, the range of possible projects is almost unlimited. This is an example of choice in its purest form!

- **Discipline-specific options**: You will select your first discipline-specific course in the spring of your second year: communication theory (for Computer and Electrical Engineers, or "**CEE's**"), or thermodynamics and fluids (for Mechanical Engineers, or "**ME's**"). It is also possible that the systems course (fall of the sophomore year) might be offered in discipline-specific flavors.

- **Passionate Pursuits:** Do you wish to design projects that pursue your creative passions for non-degree credit, at any time? (Hint: we're hoping you answer with a resounding "yes!") Well, you can do so, as long as your proposal is approved (see Appendix for details).

- **Student Research:** You can also undertake a faculty-sponsored research project in lieu of a free elective. Alternately, students who do not wish to engage a passionate pursuit may pursue a non-degree credit research activity with one or more faculty members (see Appendix for details).

Wow, some of these choices sound really important. How will I ever decide what I want to do?

Olin students will continually take an active role in their educations by thinking about and describing their personal, educational, and career goals in a **Learning Plan**. The Learning Plan is developed with the aid of at least one faculty advisor and consists of personal educational objectives and a portfolio of student work. This plan helps students think about how their educational goals are evolving over the course of four years and helps advisors frame the big questions. Learning plans are discussed in spectacular detail in the Appendix.

Can I take a free elective in the fall?

This depends upon the semester. Some semesters are fairly rigid and you must take your free elective in the spring, the default location. Other semesters offer more freedom to shift courses from fall to spring.

OK, so what's the deal with cohorts?

The cohort is simply a set of courses that are closely coordinated via a project. In the fall of the freshman year we coordinate two courses covering the fundamental mathematical and physical concepts that underlie engineering. These courses are supported by a project that integrates and motivates the theoretical material via real-world, hands-on experiences.

Possible example: Burt, Mark, and Gill form a first semester cohort known as the "BMG group." Burt is responsible for the Calculus and Differential Equations objectives, Mark is responsible for the Physical Foundations of Engineering, and Gill serves as the project coordinator responsible for project objectives. Each member of this heroic triumvirate will assess students individually in the different topic areas: *students get a grade for physics, a grade for math, and a grade for the project.*

Some of each project's specific learning objectives are identified as practical engineering skills. These objectives make certain that students learn the engineering skills needed to allow them to design and realize new ideas. For example, in the first semester the students must meet certain competencies in the machine shop. By acquiring shop skills early, students can easily construct prototypes of new ideas throughout their career at Olin. These skills are not purely technical in nature: solid writing and oral presentation skills, information research, opportunity assessment, and ethical evaluations will also appear in projects. Many of these skills are transferable across projects and are best conveyed in the form of **Practica**, which are "just-in-time" delivery of various skills that engineers and entrepreneurs use in day-to-day practice. For example, in your first project course you will complete a workshop on teaming skills, a hands-on introduction to machine shop skills, and training in electrical engineering lab techniques.

All cohorts have the same learning objectives. In other words, at the end of the cohort you will understand and be able to apply the same set of fundamental ideas regardless of which cohort you selected. However, different sets of faculty approach the cohorting differently, so your learning experience will be very different depending on which cohort you choose. Some faculty may choose to keep the three courses relatively independent, while others opt for a more integrated approach. Both have benefits and costs. Furthermore, cohorts use different projects to support the same fundamental material. Projects in the fall term might range from designing a kinetic sculpture to product design and development to robotics – so even though the content is the same, both the delivery method and the project can be radically different.

What are the advantages of teaching in cohorts?

Teaching in cohorts offers many benefits:

- Learning becomes multi-disciplinary by design.
- Teaching innovation is fostered: small teams of faculty can implement new ideas and projects with no formal administrative process.
- The same math & physics principles can be applied to different projects, thereby appealing to different student interests.

- Collaboration among faculty will prevent courses from becoming stale, and new projects can help liven up old material.
- Faculty have to "walk the walk" and demonstrate to students how to effectively work in teams.
- Tight coordination helps provide coherence to the curriculum.
- "Peer pressure" helps instructors maintain high quality: it is more difficult to let a course slip when you are working closely with others.
- Three student cohort options apply market pressure: students will not register for a cohort that does not sound interesting.
- AHS and entrepreneurship are easily integrated throughout the curriculum since *all* projects in the foundation have learning objectives in these different areas.

Wow, that sounds like a lot of great stuff. An awful lot of great stuff. OK, it sounds like an incredibly huge amount of great stuff – so when do I get to sleep?

Balance was on our minds when we wrote this. Our expectations for student work are quite realistic: the average student at Olin will spend around 50 hours per week on academic work (each individual course will occupy from 9-12 hours a week, with a cohort counting as three courses for the purposes of this calculation). This includes time in the lab, time in the shop, time in team meetings with your fellow students, homework time, and so on. We will be tracking student time very carefully to make sure that we stay true to this 50 hour per week number – woe unto the faculty member who pushes the average over 52…

I got a 5 on my Calculus BC AP. Do I have to sit through that stuff again in the cohort?

Yep.

Seriously, Olin does not accept AP credit. However, this does not mean that we plan to bore you with stuff you have seen before. If you can demonstrate at the outset of a cohort activity that you have mastered some of the associated material, you will still do the project section of the cohort, but will be given advanced topics in your area of strength to pursue independently. This allows you to learn neat stuff on your own, while at the same time learning the hands-on material associated with the project. In the most extreme case, one could imagine an outrageously well-prepared student who would spend much of her cohort time doing independent study in the calculus of variations and Hamiltonian and Lagrangian formulations of mechanics.

Having said all that, you should keep in mind that a number of your classmates got 5's on their AP's too – so it's not like we're going to assume you've never seen a derivative before. You will be challenged. Oh yes.

At Olin I have to fit a whole year of Calculus in one half semester?

Yes. Olin assumes that every entering student has a certain level of competency in Calculus. Olin clearly states the Calculus proficiency expected of each incoming student and provides resources for study and successful completion prior to entry into the Olin freshman class.

I'm utterly baffled by this Passionate Pursuit thing.

"Passionate Pursuits" is a concept that truly captures the spirit of Olin. Passionate Pursuits is Olin's way of formally recognizing that Olin students have deep passions in technical, artistic, or other areas. We consider these passions an important component of your identity that carries educational value and deserves mention alongside your other educational accomplishments.

The basic idea is that Olin will give you the opportunity to pursue your passions by providing both resources and non-degree credit for your work in an area of your choice. If you want to do a passionate pursuit for credit you write a proposal and find at least one faculty member who agrees that the pursuit deserves credit. If you want funding for a pursuit you write a grant proposal. A student-run board reviews your proposal to decide whether the activity merits funding. The faculty member or members evaluate your work when you believe you have completed your objectives, and if they concur your transcript will include a brief description of the activity. Of course, you can pursue your passion regardless of the board's or the faculty members' decisions – these mechanisms simply determine the allocation of resources and non-degree credit for these activities. Please refer to the Appendix for additional information.

Olin's prominent and provocative passionate pursuits program presupposes a particularly promising premise: student free time is a valuable and protected resource. Unless you get special permission you can only take five courses each semester. This leaves room for passionate pursuits, or you can use this "protected" time block however you like.

Is there any way you can use poetry to shed light on Passionate Pursuits?

Off the top of my head, the words of Robert Frost come to mind:

> My object in living is to unite
>
> My avocation and my vocation
>
> As my two eyes make one in sight.
>
> Only where love and need are one,
>
> And the work is play for mortal stakes,

Is the deed ever really done

For Heaven and the future's sakes.

- Robert Frost

Thanks. But what do Passionate Pursuits have to do with research?

Olin encourages students and faculty members with similar academic interests to design collaborative research projects. Student research at Olin takes three forms: research for wages, research for free elective degree credit, and research for non-degree credit. Research for a wage and research for free elective degree credit have nothing to do with passionate pursuits. In these two cases you are responsible for following the required procedures to establish a well-defined research activity. See the Appendix for additional information on all forms of student research.

The third form of research offers non-degree credit, recorded on the Olin transcript. This does relate to passionate pursuits because students can receive non-degree credit for either a passionate pursuit or a research activity at any given time, but not both.

I can handle more than five courses at a time. Can I add an additional course?

Short answer: no.

Long answer: well, still no. Apart from very special circumstances all Olin students are restricted to five courses (totaling approximately 50 hours of academic activity a week) plus one non-degree-credit activity each semester. This reflects Olin's commitment to reasonable expectations: we want our students to excel at and enjoy a realistic number of tasks rather than cram in a few extras.

You also need to consider Olin's commitment to excellence. In other words, when our faculty design a course intended to occupy nine hours of your time each week, we are assuming that you are a brilliant overachiever who tackles tasks with efficiency and enthusiasm. These courses are intense and exciting. We think your academic energies are more than spoken for, and you will probably discover that your non-course hours are cherished moments in your Olin experience.

Finally, do not forget about the non-degree credit activities that you may take each semester. You can fill some of your extra time with research or passionate pursuits that will also appear on your transcript.

So that ugly red box at the bottom of the diagram represents Gates Week?

You got it. At the end of the freshman year all Olin students must demonstrate sufficient mastery of first year material in order to proceed to the sophomore year. Therefore, the last week of the freshman year (as well as the sophomore and junior years) is set aside for **Gates Week**. Gates Week replaces a traditional finals week, but the assessment integrates across both the fall and the spring of the freshman year. Gates will include more innovative forms of assessment such as oral examinations and group exercises. In all honesty, this will be an exhilarating and exhausting week. It is worth noting that everyone (regardless of cohort) is assessed on the same material during Gates Week – and you know what that material will be from day one, since it's outlined in the learning objectives for each activity.

And – hypothetically speaking, of course – what happens if I fail Gates Week?

First of all, you don't simply get a single grade for the gate – rather, you get detailed feedback identifying areas in which you are particularly strong, areas in which you have achieved sufficient mastery to continue, and areas in which you need remediation. For areas in which you require remediation you will work with your advisor and instructors to come up with a plan for how you can receive that remediation over the summer. You will again be assessed in those areas in late August. Assuming that you have successfully come up to speed over the summer, you'll be allowed to continue to your sophomore year with everyone else.

While we're on the delightful subject of failing, what if I fail a class, or worse yet, my cohort in the fall?

While it is possible to fail an entire cohort, it is more likely that you might fail to achieve mastery of one of the courses in the cohort. Whether or not a cohort is highly integrated, each course within the cohort does get assessed separately, as do courses outside the cohort. If you fail to achieve a sufficient command of some material, you may have to spend winter break (or possibly your free elective in the spring) to complete remediation and receive credit for that subject. This remediation will be handled on a case-by-case basis in consultation with your advisor; the key point is that there is time available to deal with it.

But let's step back for a moment and talk about Olin's objectives. We are here to educate, and to have fun in the process. Gates and grading serve an important role, ensuring that all of our students, regardless of individual course and cohort selections, end up at the same intellectual destination. We don't believe in "weeding out" a certain percentage of students. If you haven't learned what we wanted you to, we'll work with you to fill in the gaps.

Hmmm, I'm still a bit confused about Fall of the sophomore year. What exactly do I have to take? How do I know which subjects get cohorted?

The fall semester of your sophomore year offers several choices, but it really isn't as complicated as it looks. All students must complete the following six subjects by the **end** of the sophomore year:

1. Signals & Systems
2. Materials Science
3. Biology
4. A Project Course (in a cohort)
5. Business Basics
6. An AHS Course

Three of these courses (the project and two others) will appear in a cohort. You will take two others as "standalone" (non-cohort) courses in the fall semester, and you will take the final course as a "standalone" course in the spring.

So which courses get cohorted? That is still an open question that will depend upon factors such as faculty availability and student interest. Each cohort must include a project and must include one technical course (Signals & Systems, Materials Science, Biology) and one non-technical course (Business Basics, AHS). This presents six possible combinations:

1. Signals & Systems, Business Basics, and a Project
2. Signals & Systems, AHS, and a Project
3. Materials Science, Business Basics, and a Project
4. Materials Science, AHS, and a Project
5. Biology, Business Basics, and a Project
6. Biology, AHS, and a Project

(We promise that this is the last "six-item" list you will have to read in this question.)

Olin College will offer three of these cohort options at a time. We have not yet chosen the three to be offered in the 2003-2004 academic year. This is an extremely difficult decision – every pairing offers unique interdisciplinary lessons and exciting project possibilities!

After choosing a cohort, each student will then select three standalone courses that address the remaining subjects. For example, if you choose the Biology/AHS/Project cohort you can take a non-cohort Business Basics course in the fall, a non-cohort Signals and Systems course in the fall, and a non-cohort Materials Science course in the spring.

Olin believes that engineering is much broader than technical knowledge and disciplines. This semester will give every student the opportunity to work on a technical project that spans topics, questions, and projects well outside the scope of engineering.

Some of these cohorts sound kind of bogus. Materials Science and AHS? Are you guys stretching a bit?

Not at all. Jon Stolk and Rob Martello are already planning a brilliant project that will produce a historically and technically accurate reconstruction of Paul Revere's copper rolling mill. The opportunities to combine history with materials science are vast. Similarly, Olin faculty can develop many fascinating ways of combining every other subject pairing.

I heard about a great course at Babson/Brandeis/Wellesley – could I take it?

Yes – assuming that the other school gives its permission. Olin offers two possible options for fitting outside courses into your schedule.

- Once a year you have a free elective option that includes offerings at Wellesley, Babson, and Brandeis. This is a virtually guaranteed way to fit in a non-Olin course (assuming that you meet any prerequisites or other restrictions, and assuming the course fits your schedule).

- If the course meets some of the Olin AHS competencies you might also have the option of counting it towards your AHS requirement. Some courses (particularly at Babson) have already been evaluated and categorized, making this relatively simple. Wellesley and Brandeis courses will be evaluated on a case-by-case basis. In general, the earliest AHS courses (i.e., during the early foundation) are the most restricted and hardest to substitute, while later offerings are easiest. All non-Olin courses must be evaluated and aligned with your overall educational strategy through entries in your Learning Plan – refer to the Appendix for more information.

So what are the AHS requirements?

During the Foundation you will take a minimum of three AHS courses: two in your first year and one in the first semester of your second year. Your very first AHS course will probably be one of two Babson foundation offerings – "Arts and Humanities" or "History and Society" (Olin faculty will teach one additional version of this course).

Your second AHS course can be a second Babson foundation offering or an intermediate level Babson AHS course ("foundation" and "intermediate" are Babson liberal arts designations). Olin will certainly offer its own intermediate AHS courses, and some courses at other schools may fit this category. Plenty of options here.

Your third AHS course is special. You might select a "cohorted" Olin AHS course that is linked to Biology, Materials Science, or Signals and Systems. If you do not select an AHS

cohort you must take another "stand-alone" AHS course. You will probably select another course from the "intermediate" AHS options listed in the prior paragraph.

Your choices will be bounded by the six AHS competencies:

1. Communication
2. Identity/perspective
3. Context
4. Ethics
5. Creativity/design
6. Scholarship

(Why does everything seem to appear in groups of six?)

At the end of each year a portion of your gate will ask you to use content and exercises from your AHS activities to address the learning objectives of the AHS competencies. You will therefore need to select activities that cover a good range of these competencies. Your advisor will have materials and checklists that help you do this.

You will also receive AHS content in projects and technical courses. Some of the AHS competencies play vital roles in these activities. For example, communication is critical in most courses, and ethics, design, and context play major roles in some technical projects. At Olin, you never know where AHS might pop up.

The AHS requirement intensifies in the junior and senior years. At this time you will take five additional AHS courses, including a unique senior year AHS capstone. But that is a story for another day.

Can I take a foreign language?

Absolutely! Babson offers foreign language courses at intermediate and advanced levels, and also offers a host of language study services in its Center for Language and Culture. Other colleges also offer language courses.

As mentioned above, you can take these courses as free electives once each year, or you can take them to fulfill some of your AHS requirement. You must justify how these courses meet the AHS competencies and other requirements, which is partially a function of the personal educational goals listed in your learning plan. Babson courses are open to Olin students, while other colleges must give permission.

What is that Sophomore Design Project?

This is your chance to make a big splash at the end of your sophomore year. By the time you get to the Sophomore Design Project, you'll have had enough hands-on experience and

theory that you can reasonably be expected to conceive an idea and bring it into reality. You'll work on a three to five member team, starting early in your sophomore year, to decide what exactly you want to do for your project. In the spring, you'll devote a serious amount of time to actually designing and creating whatever your team decided upon. This will be done fairly independently, but you will have faculty advisors who will meet with you once or twice a week to check on your progress and make suggestions. At the end of the sophomore year you'll present your project at the Sophomore Design Fair, and you'll also be asked to discuss it in your sophomore gate.

I don't quite follow the stuff about discipline-specific courses.

By the middle of your sophomore year you will be strongly encouraged to select a major, and you will start taking courses that form the foundation for that major. You will take one course in the spring that begins to form this major foundation. If you are thinking about becoming a CEE, you'll opt to take the communication theory option, whereas if you plan to become an ME, you will take the thermo-fluids option. If the General Engineering major appeals to you, congratulations! You get to pick one or the other!

Olin is so small, what if I want to take an elective that is never offered?

You will always have the option to use your free electives for independent study in an area of interest. Getting degree credit for independent study is subject to the same standards as other courses, but students can design an independent study experience under the guidance of a faculty advisor. The procedures for securing independent study credit are detailed in the Appendix. You can also take free electives at other schools, assuming they give permission (as discussed above).

Where is Entrepreneurship in the Curriculum?

Entrepreneurship appears in various forms, both as foundation requirements and optional add-ons.

In the first year, all students will learn some entrepreneurial and business skills in the context of their cohorted projects. For example, teaming and leadership skills are emphasized in the first semester, and opportunity assessment and marketing skills are vital in the second semester. Entrepreneurship becomes more explicit in the second year when all students must take a Business Basics and Entrepreneurship course as part of a first semester (product development) cohort or standalone course. All of this entrepreneurial content will appear in the first and second year gates.

But wait, there's more! Interested students may also take an entrepreneurial free elective each year. Many students will also choose to direct their sophomore year design project and senior year capstone experience toward entrepreneurship. Many entrepreneurial subjects

or topics will fall under the mantle of the AHS course stream. Further possibilities are under consideration; including a "mini IMC" (Babson Integrated Management Core) that could fast-track Olin students into upper level Babson business or entrepreneurship electives.

So when exactly do I declare a major? Can I change my mind?

You are not allowed to declare a major before the middle of your sophomore year. Although you will ideally declare a major at this time, you are not required to select a major area of specialization until the end of your sophomore year. However, if you take the thermo-fluids (ME) course in your sophomore year and then decide to become a CEE, you will need to take the communications course later.

You can repeatedly change your major until the end of the sophomore year and incur either zero or minimal setbacks (e.g., need to take no more than one additional foundation course in your junior year). After that point changes in your major will have increasing impacts the longer you wait.

I know what I want to do with my life! What if I want to declare a major at the end of my freshman year?

You are more than welcome to declare a major in your freshman year, but why stop there? Declare yourself a sovereign state! Declare your Independence!

Olin supports your right to issue as many declaratory sentences as you like. This does not change our policy regarding selection of a major – you cannot choose a major before the middle of your sophomore year.

ACT FOUR: Specialization and Realization

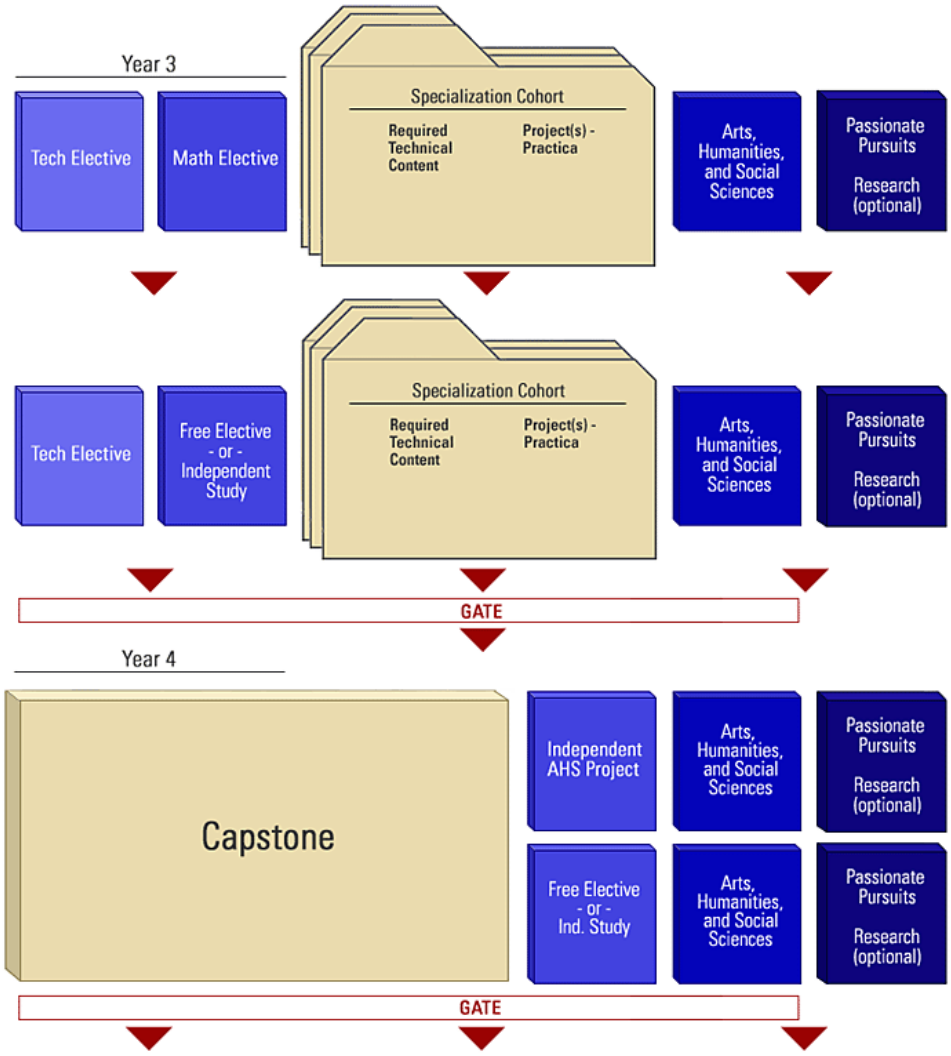
…there's a special providence in the fall of a sparrow.
If it be now, 'tis not to come;
if it be not to come, it will be now;
if it be not now, yet it will come:
the readiness is all.

Hamlet, Act V Scene II.

Olin's foundation curriculum is compatible with various types of Specialization (third year) and Realization (fourth year) elements. By the end of the foundation, all Olin students will have been prepared to fulfill Electrical, Mechanical, or General Engineering degree requirements, and are on track to meet the standards of the Accrediting Board of Engineering and Technology (**ABET**).

The ideas presented in this section are provided as a proof of concept to show that we can design a four-year ABET accredited degree program that also meets the broad objectives of the Olin curriculum. This is not a final design for these years.

Figure 3: *Illustration of concept for specialization and realization.*



The Olin Four-Year Plan

Figure 3 offers an illustration of a student's final two years at Olin. The Specialization year retains the cohort idea for many of the reasons stated above. Specialization cohorts offer some new advantages, such as:

- Attractive to potential faculty: instructors can design interesting projects relating to research areas.

- Possibility to meet standard engineering learning objectives in new and interesting high-tech specialties

- Opportunity for corporate involvement in these projects occurs at a more meaningful level than in less coordinated activities.

Specialization year cohorts might revolve around different application areas of interest. Each cohort option will link one course with a project, and a second (loosely cohorted) technical elective might be student selected to add "flavor" to the project. For example, a "Biotech" specialization cohort would cohort a biology course with a project. Some students might take Computational Science as the loosely cohorted technical elective, focusing their project on BioInformatics. A second group of students might take Entrepreneurship as the technical elective and focus on Biotech startup companies.

The large number of specialization cohorts and technical electives ensures that Olin degrees will easily fall within ABET requirements. For example, the requirements for a mechanical engineer define precise objectives revolving around the design of thermal and mechanical systems. Olin will offer specialization cohorts that focus on aspects of thermal and mechanical design that meet ABET objectives.

The Realization year centers around an ambitious capstone project that occupies at least half of the student's time each semester. Figure 3 allocates more than half of the entire year to this capstone. In some cases this capstone might be conceptually similar to a Ph.D. dissertation project, in which students design projects, fill in gaps in their knowledge, carry their work to its fruition, and discuss their results in formal papers and presentations.

The Specialization and Realization years contain several minimal requirements beyond the specialization cohort and capstone. One discipline-specific mathematics course and two technical electives are needed, along with four upper level AHS electives and a uniquely Olin AHS offering that might serve as an AHS capstone.

Corporate involvement and international experience

Overall, the general design of these two years offers much flexibility. An international experience can enter the Olin curriculum in various ways, such as:

- Junior year/semester abroad: students meet their learning objectives at another University that meets Olin's quality standards

- Specialization projects could include an international component

- Summers abroad

Involvement with corporate sponsors can also take many forms, such as:

- Capstone design experience: these projects will probably be corporate sponsored
- Company sponsorship for specialization projects
- Internships that might meet certain specialization year competencies
- Summer work experience or Co-op programs

ACT FIVE: Oh Wondrous Appendices

There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy.

Hamlet, Act I Scene V.

Appendix A: Gates

At the end of each academic year, all students must pass a gate that assesses whether they met that year's learning objectives. All gates occur during "Gates Week", a five-day period scheduled about a week after the conclusion of the spring term.

Rationale for Gates

- Gates force synthesis of material between classes and across terms. Students often see the connections between different fields when they revisit subjects and when they must learn multiple topics at once.
- Gates expose students to more realistic assessment than course-based assessment typically allows. Anyone who has survived an oral exam knows that this sort of assessment can be a great (if terrifying) learning experience. Gates also offer an opportunity for performance before an audience of experts.
- Gates clearly identify students in need of remediation.
- Gates clearly define learning objectives for all activities. Testing all students with the same instruments provides instructors with clear information as to what courses ought to achieve.
- Gates provide invaluable feedback to inform curricular innovation. Gate results allow the evaluation of different approaches to the same learning objectives in a more concrete way than is normally possible.
- Gates provide a convenient method of program assessment.

Resource Issues

- *Institutional Time*: Gates Week replaces traditional finals week in the spring, and so is nominally identical time-wise to a conventional schedule. At most, Gates Week would require a few additional days in the schedule in order to accommodate a longer reading period.

- *Faculty Time:* Gates Week makes greater demands on faculty time than traditional finals, primarily because of the inclusion of non-traditional assessment methods (e.g. oral exams and "authentic" assessment).
- *Student Time*: Gates Week unavoidably makes greater demands on students than traditional finals, as it requires students to demonstrate mastery of a year's worth of material.
- *Financial*: Compensation will be necessary if outside evaluators are used for Gates Week. Authentic assessment will probably involve purchases of equipment and supplies.

Remediation

Each student's performance on the gate is individually evaluated to identify areas in which the student requires remediation. If such areas are identified, the student works with his or her advisor to develop a summer remediation plan. In some cases (e.g., a student who requires remediation in vector calculus) remediation might take the form of self-study or enrollment in a summer course at another institution. In other cases (e.g., a student who demonstrates poor teaming skills), remediation will have to be dealt with more creatively.

Students requiring remediation are expected to pass a secondary gate in late August, before they begin their fall semester activities. Students who fail to demonstrate sufficient mastery of required material in the secondary gate will be dealt with on a case-by-case basis.

Freshman Gate

Coverage: common learning objectives defined for the first year, including material from cohorts, material from computing, and common objectives from AHS.

Method: The freshman gate includes written, oral, and authentic assessment components. A typical schedule for the freshman gate might be as follows:

- **Monday:** Two uniform (same for all students) written exams, 3 hours each.
- **Tuesday:** One uniform written exam, 3 hours; one nominally uniform oral exam, 25 minutes.
- **Wednesday and Thursday:** Authentic Assessment activity. This might be a fairly simple design problem, or a reverse engineering exercise. This might be a team exercise, or might be an individual exercise.
- **Friday:** Presentations on authentic assessment.

Creation and Administration: Faculty involved in teaching freshman subjects are collectively responsible for creating the gate. Thus, the project managers of all three cohorts might work together to design the authentic assessment component and the subject

instructors would work together to create written instruments that test the learning objectives. All freshman faculty are involved in oral exams.

Sophomore Gate

Coverage: common learning objectives defined for the second year, as well as individual objectives from AHS. The Sophomore Design project is also covered.

Method: The sophomore gate includes written and oral components, and the Sophomore Design project forms the basis of authentic assessment for this year. A typical schedule might resemble:

- **Monday –Wednesday**: Presentation and defense of Sophomore Design Project followed by individualized oral examination on subjects relevant to the project. These oral examinations would be longer and more aggressive than those in the freshman gate.
- **Wednesday**: Individualized assessment, form TBD: might revolve around AHS.
- **Thursday, Friday**: Semi-uniform written examinations, 9-12 hours total. A fraction of these exams would be tailored to major.

Creation and Administration: All sophomore faculty would be collectively responsible for the creation and administration of the gate.

FE Examination Gate

A new institution of higher education must evaluate and compare the quality of its product and the effectiveness of its curricula with reference to a national standard. The Fundamentals of Engineering (FE) examination provides one such evaluation tool and standard for Olin College.

The FE exam is a nationally recognized assessment that covers subject matter in a typical ABET-accredited undergraduate engineering program. The exam is administered by the National Council of Examiners for Engineering and Surveying (NCEES), and passing the FE exam is typically the first step in the professional licensure of engineers.

The FE exam is graded pass/fail and is designed to address minimal technical competencies in a broad range of topics, including specific areas of engineering. Although the FE exam is not effective for assessment of all competencies (particularly higher-level thinking skills), the exam format was recently modified to better address certain ABET accreditation criteria. The FE exam is not a perfect or complete assessment tool, but is an attractive means to gather specific data that may help Olin shed light on its overall program objectives and effectiveness, make some broad comparisons, and draw some general conclusions.

All Olin students are required to pass the FE examination by the end of their Junior year. Since the first two years of the Olin curriculum may not formally cover some FE exam topics, the FE requirement will necessitate self-directed student learning.

Junior Gate

This is not entirely defined at this point, as it depends on how we structure the junior year. This gate must be major-specific and ought to be fairly individualized. Given this, we imagine that this gate might be more like a PhD qualifier, with a greater emphasis on oral instruments than in the previous years. This gate will also include a capstone proposal.

Senior Gate

The senior gate is most analogous to a thesis defense. This cannot be completely defined at this time.

Appendix B: Passionate Pursuits at Olin

Success, whether personal or more widely recognized, occurs most often in those who have a passion for their work. Olin believes that learning to be passionate about one's work, to persevere through difficult times, and to enjoy play freely, are all tremendously important life lessons. In contrast to most educational institutions, we actively and explicitly promote this integrated approach to learning, work, and life. Our support of passionate pursuits promotes the idea that hobbies can be more than pastimes – they can become gateways to life-long learning and passionate endeavors.

Olin's passionate pursuit policy includes three major components:

- We commit to limiting required academic work to no more than 16 credits (48 hours) per week. This **time** commitment implies that students have sufficient time to pursue their passions. We must continually assess actual student workload and adjust the demands of our subjects accordingly.

- We recognize that students' passionate pursuits can involve substantial learning and creative components. Therefore, we offer non-degree **credit** (which is recorded on transcripts) to students who can demonstrate such learning and creativity. While a student can graduate without earning any credits for passionate pursuits, we encourage them to do otherwise.

- We recognize the need to provide **financial** support via a grant process, for supplies or expenses needed for such pursuits.

Credit Proposal: Students wishing to get non-degree credit for their passionate pursuits must submit a **credit proposal** to three faculty members, and get them to agree that the work is meritorious and that they will ultimately judge its quality. Outside experts may also play a role. The credit proposal should:

- Outline what the student proposes to do, including the nature of the **deliverables** to be presented at the conclusion of the activity;
- Propose an **assessment** for the activity. If the activity is one that requires outside assessment, the external assessor must be identified.

Grant Proposal: Students wishing to receive funds must submit a grant proposal to a Grant Board made up of students and faculty. The grant proposal should:

- Outline what the student proposes to do, including the nature of the **deliverables** to be presented at the conclusion of the activity;
- Propose an **assessment** for the activity; and
- Identify and justify the **resource requirements** of the activity.

Grant Board and Funding: The Grant Board, administered by the Student Life Office, meets early in the fall and again early in the spring to review grant proposals and decide on

the allocation of funds. The Provost's office will provide the Grant Board with a budget to fund passionate pursuits. This funding is distributed as passionate pursuit grants to students whose proposals require and merit funding. Different pursuits will require different levels of funding, so not all students will receive the same amount of funding.

Presentation/Performance: In order to earn credit for a passionate pursuit, students must give an assessed presentation or performance at the conclusion of the activity. This might take the form of a recital, an exhibition, a technical talk, or a combination of the above. Note that this requirement does limit the scope of eligible activities – the activity must be amenable to a meaningful presentation or performance. The three overseeing faculty will determine whether non-degree credit is merited after viewing this presentation or performance. It is possible that the presentation will be held privately due to intellectual property issues or concerns about issues of community acceptance, but all three faculty members must attend.

Advantages

The passionate pursuits program offers many benefits to students, including:

- Practice at selling their ideas and convincing others about the merit of one's passions
- Experience at securing funding through proposal writing
- Practice at teaching and presenting one's own work
- Intrinsically motivated learning
- One avenue for infinite student choice
- Student control over a component of their own education
- A prototype for lifelong learning
- An easy way to accommodate a variety of activities, including research, art, design, etc.
- The possibility of team activities (e.g. solar car team)
- Another illustration of how Olin "walks the walk" by giving acknowledgement for well roundedness and personal initiative

Narrative Illustration: In early September, Polonius decides he wants to do pottery as a passionate pursuit. He writes a Passionate Pursuit proposal and convinces three faculty members that his plan to carve and burnish hand-built pieces is meritorious. They agree that he will receive three units of non-degree credit when he completes his pieces.

With faculty assistance, Polonius revises his proposal to address some specifics. He also writes a short grant proposal to cover tool and clay costs and states that his deliverable will be an exhibition of four finished pieces and a presentation in which he discusses some of the history of this type of pottery. He estimates a budget of $200 and also notes that he will need to use the school kiln at least twice.

In late September, a committee of faculty and students reviews and approves Polonius's funding proposal. By December, Polonius has made some significant progress on his

pottery and research but does not feel ready to show yet. He notifies the three faculty that he will not show until the spring. While somewhat disappointed, the faculty understand that this work is on Polonius's own timetable.

In April, Polonius feels ready to show his work. He organizes an exhibition and gives an exhibition talk. His three faculty advisors attend the talk and exhibition and provide positive written feedback to Polonius. Based on this feedback and Polonius's exhibition, the three Olin faculty approve Polonius's Passionate Pursuit for three hours of non-degree credit.

Appendix C: Research

Olin strongly encourages its students to engage in research with one or more faculty members. In its broadest sense, research offers many benefits to students:

- Research provides opportunities for close student-faculty interaction
- Research adds another dimension to the learning experience and broadens the student's perspective
- Research provides exposure to new disciplines and development of new skills
- Research provides additional opportunities for hands-on experiences with specialized laboratory equipment, modern computing facilities, or advanced experimental techniques

To facilitate this important activity, Olin recognizes three ways in which student research will be recognized.

1. Research for compensation

On occasion, an Olin student may wish to accept a research position for compensation rather than course credit. In these cases, the student must follow the current Olin guidelines for student employment (no more than 10 hours per week, specified pay scale, etc.). Neither degree nor non-degree credit will be granted for compensated research activities.

Advantages:

- Students receive an hourly wage
- Students need not count their research against their academic credit limit
- Students may simultaneously participate in a passionate pursuit

2. Research for course elective credit (degree credit)

Students may attempt to receive elective credit for their research. This requires careful planning on the student's part.

- **Student proposal.** Within the first week of the semester, students submit a research project proposal for group faculty review. The proposal must include estimates of weekly student time requirements, identification of at least one faculty mentor, and an assessment strategy (see "assessments" below).
- **Proposal approval.** At least the faculty advisor must approve all research proposals for course credit.
- **Registration.** Research requires registration and an advisor's approval in the same manner as all other academic activities. The registrar must count research activities

towards a student's semester credit limit. The research project may be used as a free elective and in rare cases as a constrained technical (engineering/science) or AHS elective course.

- **Time limit.** Research projects must be completed no later than the last day of the semester.
- **Deliverables.** In addition to project-specific deliverables, students must deliver a product, a written report, and an oral presentation before a group of faculty and students.
- **Grading and Assessment.** Grading of research projects will follow the same guidelines as other for-credit courses. Faculty must design an assessment plan and share it with the student(s) prior to the start of research activity. This plan should discuss instructor availability during the period, a schedule of deliverables, and the expectations for a passing grade.

Advantages:

- Students receive degree credit
- Closure is guaranteed at the end of one semester
- Students gain experience in proposal writing
- Students gain experience in written and oral presentation of technical content
- Students may simultaneously participate in a passionate pursuit

3. Research for non-degree credit

Students may also choose to conduct research for non-degree credit. This does not count against a semester credit limit but does prevent concurrent participation in a passionate pursuit.

- **Student proposal.** Students submit a research project proposal to their advisor and to their faculty research supervisor at any time. The proposal must include estimates of weekly student time requirements, identification of at least one faculty mentor, and an assessment strategy (see "assessments" below).
- **Proposal approval.** The faculty advisor and faculty mentor must approve a research project prior to its inception. Ongoing passionate pursuit activities will delay the start of research until the passionate pursuit is concluded.
- **Time limit.** Research projects must be completed within the time limit specified in the proposal. Students can only receive three credits of non-degree credit each semester, so it is in their best interests to define a project with deliverables that can be completed and assessed by the last day of the semester.
- **Deliverables.** In addition to project-specific deliverables, students must deliver a written report to their advisor. A concluding oral presentation before a group of faculty and students is recommended but not required.
- **Credit Grading and Assessment.** Faculty and students must agree upon an assessment plan prior to the start of research activity. This plan should discuss instructor availability during the period and a schedule of deliverables that will define

adequate performance. When the mentor is satisfied that the work has been completed, she/he can notify the advisor and the registrar that three units of non-degree credit are to be added to the student's transcript.

Advantages:

- Students receive non-degree credit on their transcript
- Students gain experience in proposal writing
- Students gain experience in written presentation of technical content
- Students may take a full courseload of classes and electives
- Students may participate in lengthy research projects without worrying about their credit limit each semester

Appendix D: Independent Study

Olin students will undoubtedly spend most of their academic time and effort in courses and projects. These activities insure that students receive the proper preparation for gates and for their future career, while also offering opportunities to develop teamwork and social skills.

Olin students might occasionally want or need to undertake an independent study activity. Olin College currently recognizes two specific instances of sanctioned "independent study," listed below.

1. Independent study as remediation

Students occasionally fail courses and run the risk of falling behind as they attempt to make up the content and missing credits. Independent study offers one vehicle for remediation by allowing students to complete course requirements on their own and receive credit.[2] The following restrictions and conditions apply:

- **Instructor approval.** The instructors of the course must agree that independent study constitutes a valid mechanism for satisfying the requirements for this class. Instructors are not required to design or assess independent study options for their courses.
- **Instructor case-by-case evaluation.** Instructors who support an independent study option for their course must still decide whether each particular student can receive credit in this manner. In some cases students might have too much work to make up via this mechanism. Instructors must determine this before the student undertakes the activity.
- **Time limit.** Independent study must be completed no later than the end of the semester after the failed course.
- **Registration and credit overload.** Independent study requires registration and an advisor's approval in the same manner as all other academic activities. The registrar must count independent study credits towards a student's semester credit limit if the activity continues beyond the first day of classes.[3] Therefore, students are strongly encouraged to use January and the summer for this activity.
- **Grading.** By default, successful completion of independent study results in a new grade that does not delete the prior failing grade from a student's transcript. Instructors can opt to replace the prior grade with the new one. Failure to complete independent study does not appear on the transcript.
- **Assessment.** Faculty must design an assessment plan and share it with the student(s) prior to the start of independent study. This plan should discuss

[2] Please note that students who fail a gate do not have this option.

[3] If independent study continues longer than the first day of classes it counts towards the student's semester credit limit. Therefore, this will not enable the student to make up lost credits from the prior semester. See "independent study free electives" for a corrective strategy that will help students catch up.

instructor availability during the period, a schedule of deliverables, and the expectations for a passing grade.

Advantages:

- This option prevents occasional incompletes and failing grades (perhaps for reasons beyond a student's control) from severely impacting academic progress (e.g., missed prerequisites or delayed graduation). Students deserve opportunities to "catch up" after falling behind.
- Avoids overloading a student who is already struggling to keep up.
- Students can work on their own and at their own pace.

Narrative Illustration:

Laertes fails his Real Time Systems class in the first semester of his freshman year. Upon receiving the failing grade he meets with his instructor and learns that she established an independent study option: if he reads through a web tutorial, completes two large assignments, and then passes a final exam, he will receive a three-credit "Pass" for this activity. (The failing grade from the first semester is still on the transcript.)

Laertes now has a choice. If he can complete this by the start of the spring semester, he will have the correct number of credits and be completely caught up. If he requires additional time, he will have to register for computing as independent study in his spring semester in lieu of an elective that he must make up later.

2. Independent study electives

Olin faculty can design "ready made" independent study modules for student use (this can incorporate online assignments, pre-selected content materials, a schedule of deliverables, meetings with faculty, and assessment guidelines). Students can then complete the module at their own pace (but within a time limit) and receive elective credit. The following restrictions and conditions apply:

- **Activity approval.** Independent study topics and procedures are subject to the same academic standards as traditional elective courses. This might include review of the workload and deliverables by an academic board. This issue is particularly important if the student undertakes independent study between semesters (i.e., in January or over the summer) because the total workload must equate to a traditional semester offering.
- **Instructor approval.** In most cases an instructor will pre-design an independent study module and make it available to interested students. In rare cases a persuasive student might convince a faculty member to design an independent study activity on the spot (perhaps with student assistance) to address that student's area of interest. This is acceptable as long as the faculty member is qualified to assess the deliverables and agrees that the work expectations are equivalent to that of an elective offering.

- **Registration.** Students register for independent study with the registrar and require the approval of both their advisor and the instructor.
- **Time limit.** Independent study must be completed by the end of the period in which it is offered, i.e., by the end of the academic semester, summer, or January activities period.
- **Grading.** The instructor establishes grading guidelines.
- **AHS credit option.** In very specific cases (subject to approval by at least three AHS faculty members) independent study can substitute for an AHS elective. This option also requires an extra entry in the learning plan to explain how the independent study fits into that student's overall AHS strategy.

Advantages:

- Olin students are motivated self-learners who can excel in unrestricted settings. Some students might prefer this learning method to a traditional course.
- Students have a second way to recover from failed or "incompleted" classes. They can defer elective credits complete them over summers or during January.
- This option also helps students who wish to build up extra credits prior to a semester away from Olin (or a light load).

Narrative Description: Recover from Failed Class

Laertes failed his fall semester Real Time Systems class and decides he cannot complete it before the third week of the spring semester (see prior example). The independent study "make-up" activity takes the place of his spring free elective. At the end of the spring semester he has amassed 13 credits from the fall semester and 16 from the spring semester – he has fallen behind by three credits.

Laertes learns of a summer independent study option in French history and culture. He investigates this activity and learns the expectations: complete a checklist of activities that includes three visits to Babson's center for language and culture, write book reports on three texts, read a set of course-specific web pages, have at least three face-to-face meetings with the instructor, and write a 15 page final paper from a pre-selected list of topics. All of these activities must be completed before the start of the fall semester.

Laertes receives formal permission from his advisor and then contacts the instructor of the independent study. He receives a packet of information consisting of the names of the texts, paper topics, and access to web pages. Laertes registers for the activity at the end of the spring semester and arranges to spend June at Olin College. He completes his Babson visits, web exercises, face-to-face meetings, and two book reports by the end of June, and decides to write the third book report and paper at home in July and August.

He completes his assignments on time to the instructor's satisfaction. The faculty member informs the registrar, and three elective credits appear on his transcript.

Appendix E: Learning Plans

A "Learning Plan" is a student-produced work in progress that accomplishes four broad goals:

- Continually encourage students to take an active role in their Olin experience by making them state and refine their personal, educational, and career goals.
- Help students choose their curricular activities by making them evaluate how each potential activity might further their goals.
- Help Olin faculty refine their course offerings and evaluate offerings at other institutions by asking students to provide feedback at specific times.
- Insure that students meet all of their Olin requirements in a timely manner by offering checklists and asking students to formulate action plans.

Learning Plans consist of three types of input.

1. Personal Objectives

Students submit reflexive essays at five times during their education. These essays describe the student's broad career and personal goals and formulate relatively long-term plans of action. Specific submissions are as follows:

End of First Quamester: The first major learning plan assignment is a short and simple bulleted list. Students work with their advisor to brainstorm:

- Proposed major (or list more than one, with pros and cons for each)
- Possible career directions (certainly more than one)
- Areas of AHS that might prove interesting or pragmatic
- Goals for the freshman year (advisors can begin this part of the exercise by reading from a possible list including options such as "Choose my major," "Improve my oral presentation skills," "Decide whether I prefer to concentrate in history or literature," etc.)

End of First Year: This assignment is in the form of an essay. Essay sections (about two paragraphs each) include:

- *Freshman year "take-home message"* (key content, lessons learned, skills learned, new goals)
- *Major* (what will be my major and why; OR how will my activities over the next semester or two help me choose a major)
- *AHS and Entrepreneurship* (how will AHS and entrepreneurship help my education, particularly next year but also long-term)
- *Gates and goals* (respond to checklist – how will I prepare for the gates and meet all other Olin foundation requirements)
- *Personal goals* (add to the Olin goals – what do I hope to accomplish in the year to come)

- *Project brainstorming* (what are some possibilities for my second semester sophomore year project – broad is acceptable)
- *Junior year brainstorming* (will I spend part of junior year off-campus, how will I prepare during my sophomore year to insure that I am ready for this experience)

End of Foundation: Revise and refine the freshman year Learning Plan draft by writing at least two additional paragraphs on each of the following topics:

- *Take-home message:* similar to end of first year report, revisit sophomore year.
- *Personal goals:* similar to end of first year report, establish or confirm personal goals.
- *Junior year proposal:* Academic plan for junior year (plan must be coherent and specific for the fall semester – course list and justification – and can be a bit vaguer for the second semester).
- *AHS and Entrepreneurship:* same as end of first year report but apply to remainder of Olin experience.
- *Study abroad:* Interest in studying away from the Olin campus, and if so, why?
- *Gates and goals:* Coherent plan for completing all Olin requirements.
- *Capstone:* Preliminary thoughts about capstone project, possible topics, ways upcoming classes will help flesh this out.
- *Career plan:* Preliminary career plan (more specific career proposal than before, can and should list several options but should explain how this list will be narrowed in terms to come).

End of Third Year: Further revision and update of Learning Plan. This one should have exactly the same categories as the "End of Foundation" document.

Prior to Graduation: Olin believes in lifelong learning. One element of the capstone project (or a separate deliverable) might include an extrapolation of the learning plan to cover post-graduation activities and offer a final review of all educational activities.

2. Activity Objectives and Feedback

Students also complete smaller writing assignments before **and** after undertaking the following activities:

- All AHS classes.
- All off-campus classes.
- All Entrepreneurship classes.
- Passionate pursuits.
- Research.
- Independent study.
- On-line classes.
- Second term sophomore year project.
- Study away from Olin.
- Internships.

Prior to undertaking these activities, students write a one-paragraph proposal explaining what they hope to gain from this activity and which Olin requirements it will satisfy. The length and guidelines for this assignment might change based on the activity – for example, study abroad will require a longer proposal and recap.

Upon completion of these activities, students will write a recap (usually one paragraph, as long as one page) of the activity describing what was done, what was learned, and how it fits into their educational goals and the Olin competencies.

Different parties will assess each student's Learning Plan at different times. The student's advisor will appraise most assignments but one or two of the most important revisions/submissions of the Learning Plan might include presentation to or review by a larger committee.

3. Portfolio of students' work

As a component of their learning plans, students will keep a portfolio of works that they have created during their course of study at Olin. This portfolio offers students tangible and accessible evidence of their progress toward their educational goals. At least one example of the student's work *per semester* should be included within the portfolio. The items included within the portfolio should represent some of the student's strongest work, and they should also serve as examples of the progress the student has made on their educational, career and personal objectives. The portfolio should include diverse representations of the student's activities (i.e. the portfolio should not be made up exclusively of eight CAD drawings).

A short description (1-2 paragraphs) should be included with each item selected. This description should explain why the particular work was selected, the goal of the project/report, what they learned from the creation of this work, and a reflective critique of how the item met the objectives or how the student would improve the work if they were to do it again.

Examples of materials that may be included in the portfolio are:

- Representations of design products produced by the student
- Examples of compositions written by the student
- Recordings, drawings or other artistic works created by the student
- Written reports and/or presentation materials

Epilogue: Once Upon a College

Thank you ladies, lords, and sages
For perusing countless pages.
Reading text is surely fun
But our great task is just begun.
We're hoping soon to hear your questions
Comments, plans, and new suggestions;
Make your boldest thoughts take flight
And innovate with all your might.
Approach this with unbending will
For we're a college on a hill.
Olin's banner, once unfurled,
Will loose new dreams upon the world
And history will soon acknowledge
What happened … once upon a college.