

# Preparing for Success: Maximizing Opportunities for the Inaugural Graduating Class at Olin College

by

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**Executive Summary.** In two short years the Class of 2006, Olin College's inaugural class, will graduate and move on to new challenges. Clearly this is a major milestone event, both in the lives of these students and in the development of Olin College. Maximizing the success of this inaugural class in securing outstanding employment, graduate school, and entrepreneurial opportunities is central to our mission. It is also essential in establishing Olin College as one of the most distinguished engineering undergraduate programs in the country. The College is working very hard to provide an exceptional educational experience on campus. However, to provide our graduates with the edge they will need to compete successfully at the highest levels, we will need to provide them with professional opportunities that extend beyond our campus. Increased support from industry, sister institutions, and friends and advisors will be essential. This paper outlines some of the areas that would benefit from external advice, advocacy, and support. These include continuing enhancements to our evolving curriculum, off-campus educational experiences and internships, increased recognition and credibility, employment opportunities for graduates, and graduate educational opportunities. We only have one opportunity to place the inaugural class, and it is essential that we do all we can to set a high standard of success. Few other factors will have a greater impact on the College's future than the success of the first graduating class. At this meeting we intend to solicit the advice and support of all members of the extended Olin community in identifying and developing opportunities in this area while there is time to address them.

**Curriculum.** The Olin curriculum offers degree tracks in Engineering, Electrical and Computer Engineering, and Mechanical Engineering. This spring the curriculum was revised in several significant ways to improve the efficiency (require less faculty time per student while preserving educational effectiveness) and simultaneously strengthen the entrepreneurship and design threads throughout the program. These changes were motivated by our experience in delivering the first two years of the program, and by our better understanding of the programmatic needs for the advanced courses in the last two years. The revisions did not change the degree programs, goals, objectives, or character of the programs, but instead focused on how we deliver these programs. An outline of the revised curriculum currently in effect is provided in Appendix A. We believe that the revised program is more sustainable and will also help meet ABET accreditation requirements.

Sample programs of courses leading to each of the current degrees in the revised curriculum are given in Appendix B. As shown in the example, the program provides a solid foundation in mathematics and science, basic engineering sciences, design and project experience, arts and humanities, advanced technical subjects in the discipline, and also contains enough flexibility to allow student to pursue special interests or study abroad for a semester. For students of the quality attracted by Olin, this flexibility is essential. In addition to courses our program also requires demonstrated competencies in certain areas. Evaluating competencies is best done by oral exams and interviews involving experienced engineers from industry. We will need help from industrial partners in developing a corps of effective "coaches" for this purpose.

We intend to review the curriculum for needed improvements each year, and within the limitation of our resources, make improvements that enhance the educational experience. We invite the reader to send us suggestions for curriculum enhancements that would improve the career and graduate study opportunities for our graduates.

**Capstone Project.** A central feature of the Olin curriculum is the year-long 8 credit hour capstone senior project. This project is intended to insure that all Olin graduates complete a substantial design experience with high standards for professional achievement. Probably the best assurance of such achievement is the involvement of corporate sponsors for each project. For many years Harvey Mudd College has run a highly successful “clinic” program in which every engineering graduate is required to work on a team to complete a substantial project with a corporate sponsor who provides significant financial support. The involvement of a real client and a real engineering project raises the expectations enormously and results in student performance also rising in response. The Harvey Mudd College clinic experience has been excellent, with corporate clients returning year-after-year to sponsor follow on projects. We hope to develop a form of this clinic model at Olin to insure the best possible educational experience for all of our students. Of course, this will take considerable help from our friends and supporters in the corporate community.

**Off-campus Experiences.** The most attractive candidates for the best technical employment opportunities usually have significant experience with an internship or co-op in industry. Some top corporations expect nearly all new employees to have such experience. Students who gain this experience enhance their employability by learning the necessary skills, attitudes, and behaviors in the practice of engineering. In addition, they gain exposure to the professional engineering world early enough in their education to guide them in making critical career choices between employment and graduate school. As a very small and largely unknown institution, Olin College faces significant challenges in securing the attention of important corporate partners. We have made a good start in this area through the efforts of our Director of Corporate Relations, Ms. Leslie Larocca, and several dedicated members of the Trustees, President’s Council, parents, and friends. As of today a total of 16 of our 147 students (or 11%) have plans for internships off campus this summer. They will be employed at such institutions as MITRE, IBM, Samsung, NASA, US Army Natick Soldier Center, etc. However, many more opportunities will be needed in the next few years.

In addition to corporate internships that provide a window on the professional practice of engineering, internships in government or university research laboratories also provide important experiences for top engineering graduates. Many of Olin’s first graduates will pursue advanced education and careers in research and development that involve creating new knowledge. Direct experience in a research laboratory with graduate students at a university is invaluable in preparing graduates for competitive research fellowships in graduate school. It also provides students an opportunity to learn about careers in the academic world at an early age so that they may make better career decisions. Again, Olin College faces similar challenges in securing the attention of important partners at research universities. In spite of this, a total of 19 of our 147 students (or 13%) will be involved in Research Experiences for Undergraduates (REUs) or other summer research experiences at such institutions as Tokyo Institute of Technology, University of Chicago, Stanford University, MIT, Boston University, University of Illinois at Champagne-Urbana, Oregon State University, Texas Tech University, Tufts University, and Olin College.

Finally, the growing emphasis on globalization of engineering increases the value of study away experiences for undergraduates. Whether graduates pursue employment in the corporate sector, start their own business, or pursue graduate education, exposure to life in a foreign culture can provide important insights and perspectives that greatly enhance future career success. Creating and supporting such opportunities around the world for the small number of students at Olin College is a challenge on several levels. The Olin curriculum is designed to allow motivated students to plan their program for a Study Away experience in the junior year. We have made a very good start in developing linkages with other institutions and arranging for members of the Class of 2006 to take advantage of this next year. At present 17 of the 72 juniors (or 24%) are planning to study abroad next fall, and several more will undoubtedly study abroad next spring. Further details are available at our Study Away web site (<http://awayprograms.olin.edu>). The 17 students will be studying in Australia, Austria, Hungary, Japan, Mexico, New Zealand, Scotland, Sweden, Switzerland, and Singapore.

To maximize the career opportunities for our graduates we would like to provide every student with the opportunity for a corporate internship, an REU experience, and a Study Abroad experience. This is only possible with help from many supporters off campus.

**Recognition and Credibility.** Graduates of programs with high name recognition for academic quality often have an advantage in obtaining desirable opportunities. While Olin College obtained a significant amount of favorable national press coverage in the first few years, the rate of appearance of such articles has begun to slow down. This is mostly because the story of a start-up college with excellent funding and high aspirations is no longer headline news. As a result, it will likely be harder for Olin to obtain national visibility in the next few years. It is important that those who know us best become involved as advocates when appropriate to compensate for our lack of alumni and our small size. The most effective stories focus on solid achievements, such as those of our students and faculty.

One challenge we have faced is the stereotype that undergraduate institutions cannot be engaged in meaningful scholarship or research. We occasionally receive comments from external reviewers of competitive research proposals at the National Science Foundation and elsewhere that indicate a hesitation to support research at Olin because of the belief that significant levels of high quality research cannot be carried out at an undergraduate institution. However, from its inception Olin College set out to challenge this assumption. Olin College is not a “teaching-only” institution, but embraces intellectual vitality in many forms, as discussed at the May 2003 President’s Council meeting (*The Role of Intellectual Vitality at Olin College*, R.K. Miller, Olin College white paper, April 2003). With a total of only 25 faculty members, Olin currently has more than \$3.5 million in external research awards. Last year its research expenditures exceeded \$1.5 million. A recent publication at Olin (*Intellectual Vitality Activities 2002-2003*, Franklin W. Olin College of Engineering) documents the scholarly activities of our community for one academic year. We believe the results reported in this publication demonstrate that Olin College already has established an enviable record of performance in this area. The national visibility of Olin’s faculty is also remarkable for a small undergraduate institution. For example, one of our faculty members (Dr. Sherra Kerns) is incoming President of the American Society for Engineering Education and a recent speaker at the National Academy of Engineering. We need to get the word out to important constituencies that Olin is different from other undergraduate institutions in the level of research and scholarship it supports.

The achievements of Olin students at a national level are also remarkable. Last October Kori Haymore ('06) was selected by the Federation of American Scientists as one of two national winners in an essay contest focused on the use of technology to enhance K-12 education. As part of this award she was invited to present her concept to a committee of the U.S. Congress. Three other members of the Class of 2006 (Nicole Hori, Steven Krumholz, and Dan Lindquist) tied for first place in the 2002 Interdisciplinary Contest in Modeling administered by the Consortium for Mathematics and Its Applications and funded by the National Security Agency. Just last month two more members of the Class of 2006 (Bret Richmond and Jeff Satwicz) along with two Babson MBAs were chosen winners of the \$20,000 Douglass Prize at Babson College for the outstanding MBA business plan this year. This is just a sample of the outstanding achievements of this class of 72 that is just now completing the sophomore year. If this is any indication of the potential for national achievement of our alumni (and we believe it is), Olin graduates will differentiate themselves and Olin College from the mainstream of undergraduate institutions by their accomplishments. We need to make sure potential graduate schools and employers realize the distinctive quality of our students<sup>1</sup>.

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<sup>1</sup> Another distinguishing feature of the Olin student body is the fact that it is nearly gender balanced. For a program that is based largely on degrees in electrical engineering or mechanical engineering, this is unusual because these two programs have the lowest participation by women of any engineering major.

**Opportunities for Graduate Education.** It is likely that a substantial fraction of the Class of 2006 will seek to continue their formal education in a program of advanced study. While the majority of such Olin graduates will likely seek admission to graduate programs in engineering, a fraction may seek to pursue other fields such as medicine, law, business, natural sciences or mathematics, among others. Many of these students turned down admission to the best research universities in the nation to attend Olin College as undergraduates with the expectation that they could attend these universities for graduate study. In order to prepare our graduates for this path it is essential that they receive excellent preparation in their advanced coursework at Olin College, and that they score well on standardized tests like the Graduate Record Exam (GRE). In addition, they will need letters of recommendation from faculty members and internship supervisors that convey the distinctive quality of their achievements and the rigor and uniqueness of the Olin academic program. Support and advocacy from our friends and partners will be most helpful in this regard.

Olin College recently hosted an accreditation site visit by an academic team assigned for this purpose by the New England Association of Schools and Colleges (NEASC). Near the end of the visit several of the visitors mentioned to us that the quality of the students at Olin is exceptional, and we should consider them strong candidates for prestigious national fellowships such as Rhodes, Marshall, or Fulbright awards. We agree that some of our students would make strong candidates for such awards, and we intend to do all that we can to prepare them for the competition. However, coaching is likely to play a significant role in preparing for success in such competitions. Therefore, Olin College is seeking to recruit appropriate staff members with appropriate experience to provide the best possible opportunity for our graduates for the competition in this area.

**Employment Opportunities.** Many of the most successful U.S. technology companies recruit for new employees from a small list of highly recognized engineering schools. Sometimes this list includes only schools that score highly in the U.S. News & World Report ranking of graduate programs in engineering. Often they restrict their active recruiting to programs that are accredited and that produce a significant number of graduates in fields of direct interest to them. From the perspective of the employers this is entirely reasonable. However, Olin College cannot be accredited when the Class of 2006 graduates (because all accreditation agencies require that at least one class graduate before the college is eligible for evaluation). In addition, Olin College has no plans to establish a graduate program. Furthermore, Olin College will always produce only a small number of graduates. Therefore, we expect special challenges in gaining the attention of important technology companies as potential employers for our graduates. Advocacy by our friends and supporters will be needed to open doors at top technology companies. They will have to be persuaded to make exceptions for Olin College on the basis of the quality and uniqueness of the program and its students.

**Educational Partnerships with Neighboring Institutions.** A very important dimension to the academic program at Olin College is provided by the opportunity for Olin students to cross-enroll at neighboring institutions. This collaborative philosophy was fundamental to the plan for establishing Olin College, and although our program is very young and quite small, the record of cross-enrollment of Olin students at neighboring Babson College, Wellesley College, and Brandeis University is remarkable. In the current semester, 47 Olin students are enrolled at Wellesley College, 20 at Babson College, and another 19 at Brandeis University. The breadth of educational opportunities at such distinguished institutions is essential to the character of the educational experience we are building at Olin College. The academic performance of the Olin students at each of these institutions has been very high, as expected. Furthermore, the early success of student partnerships between Olin and Babson in business plan competitions provides confirmation that these joint academic endeavors add value to both programs. However, at this point very few students from other institutions have enrolled at Olin College. One of the reasons why students from these other institutions are slow to enroll at Olin is the fact we are not yet accredited, and faculty at these neighboring institutions are not familiar with the content and rigor of our programs. To insure continued growth of these promising academic partnerships, it is

essential that Olin develop educational opportunities that are recognized and valued by their students and faculty. In addition, Olin can and must provide other offsetting benefits to these institutions.

**Setting Priorities and Planning for the Future.** As we accelerate our plans for the first commencement exercises at Olin College in two short years, much remains to be done. As noted in this paper, the advocacy and support from friends and associates in the corporate world and in other academic institutions can provide a much needed benefit to our inaugural graduating class. As we plan and prioritize our efforts for the next two years, the reader is asked to consider the following fundamental questions:

1. Will the current Olin College curriculum adequately prepare our graduates to succeed in obtaining opportunities for employment or graduate education at top technology companies and graduate schools?
2. How can Olin College best obtain corporate support for student internships, sponsored capstone projects, and employment interviews for our graduates?
3. How can Olin College best communicate the distinctive character of its educational programs, students, and faculty?

Your comments on these questions are important to us, and will be given serious consideration as we finish our strategic planning exercise this year.

## Appendix A – Outline of Revised 4-year Curriculum at Olin College

Illustrated below is a possible program of study. The first two semesters constitute the Foundation and are common to all majors. The next four semesters constitute the Specialization phase, where major-specific core subjects are covered. The last two semesters constitute the Realization phase, highlighted by the engineering capstone as well as the Arts, Humanities, and Social Science/Entrepreneurship (AHS/E!) Capstone. Either the 5<sup>th</sup> or the 6<sup>th</sup> semesters can be arranged as an away experience.

A Possible Program of Study						
S e m e s t e r	1	Engineering of Lumped Systems	Calculus	Physics : Mechanics Temp. and Heat Resonance	Design Foundation including Mechanical Fabrication and CAD	AHS Foundation
	2	Engineering of Spatially Distributed Systems	Vector Calculus	Physics: E&M Statics and Quasistatics Acoustic + EM Waves	Biology	E! Foundation Optional
	3	Linear Algebra Math	Engineering Design	Chemistry or MatSci	AHS	Optional
	4	Probability and Statistics Math or Science	Engineering Core	Engineering Core	User Oriented Collaborative Design	Optional
	5	General Elective	Engineering Core	Engineering Core	AHS	Optional
	6	Optional	Engineering Depth	Optional	AHS/E!	Optional
	7	Science or Math Math or Science	Product Design	Capstone Project	AHS/E!	Optional
	8	Technical Self-Study	Technical Elective		AHS/E! Capstone	Optional
K e y	Math	Science	Engineering (w/ Project)	AHS / E!	Fixed Time	

## Appendix B -- Engineering Degree Subject Requirements (credits in parentheses)

### Math and Science (30)

#### Math Foundation (8)

- Calculus (2)
- Vector Calculus (2)
- Linear Algebra (2)
- Probability and Statistics (2)

#### Science Foundation (14)

- Foundations of Physics (6)
- Chemistry or Materials Foundation (Choose one)
  - Foundations of Materials Science (4)
  - Introduction to Chemistry (4)
  - Organic Chemistry (4)
- Foundations of Modern Biology (4)

#### Math Elective (2)

#### Math/Science Elective (6)

### Engineering (50)

#### Engineering Foundation (10)

- Engineering of Lumped Systems (3)
- Engineering of Spatial Systems (3)
- Principles of Engineering (4)

#### Design Foundation (8)

- Introduction to Design (4)
- Collaborative User Based Design (4)

#### Design Depth (4)

#### Engineering Specialization Core (16)

- Concentration Dependent

#### Engineering Depth (4)

- Concentration Dependent

#### Capstone (8)

### AHS/E! (28)

#### AHS Foundation (4)

#### Entrepreneurship Foundation (4)

- Foundations of Business and Entrepreneurship

#### AHS/E! Electives and Depth (16)

- At least 8 must be AHS
- At least 8 must be AHS or E! depth

#### AHS/E! Capstone (4)

- Capstone area (AHS or E!) must be the same as depth area

### Electives (12)

#### Technical Elective (4)

#### Self-Study Technical Elective (4)

#### General Elective (4)

**ECE Degree Subject Requirements**  
(credits in parentheses)

**Math and Science (30)**

Math Foundation (8)

- Calculus (2)
- Vector Calculus (2)
- Linear Algebra (2)
- Probability and Statistics (2)

Science Foundation (14)

- Foundations of Physics (6)
- Foundations of Materials Science (4)
- Foundations of Modern Biology (4)

Additional Math

- Differential Equations (2)
- Discrete Math (4)

Math/Science Elective (2)

**Engineering (50)**

Engineering Foundation (10)

- Engineering of Lumped Systems (3)
- Engineering of Spatial Systems (3)
- Principles of Engineering (4)

Design Foundation (8)

- Introduction to Design (4)
- Collaborative User Based Design (4)

Design Depth (4)

Engineering Specialization Core (16)

- Signals and Systems (4)
- Software Design (4)
- Computer Architecture (4)
- Introduction to Analog and Digital Communications (4)

Engineering Depth (4)

See catalog for approved courses

Capstone (8)

**AHS/E! (28) (see Engineering Requirements)**  
**Electives (12) (see Engineering Requirements)**

**ME Degree Subject Requirements**  
(credits in parentheses)

**Math and Science (30)**

Math Foundation (8)

- Calculus (2)
- Vector Calculus (2)
- Linear Algebra (2)
- Probability and Statistics (2)

Science Foundation (14)

- Foundations of Physics (6)
- Foundations of Materials Science (4)
- Foundations of Modern Biology (4)

Additional Math

- Differential Equations (2)
- One of
  - Partial Differential Equations (4)
  - Non-linear dynamics (4)
  - Approved mathematics course appropriate to plan of study (4)

Math/Science Elective (2)

**Engineering (50)**

Engineering Foundation (10)

- Engineering of Lumped Systems (3)
- Engineering of Spatial Systems (3)
- Principles of Engineering (4)

Design Foundation (8)

- Introduction to Design (4)
- Collaborative User Based Design (4)

Design Depth (4)

Engineering Specialization Core (16)

- Mechanical systems (6)
  - Statics (2)
  - Mechanics of solids (2)
  - Dynamics (2)
- Thermal/Fluid Systems (6)
  - Transport Phenomena (2)
  - Thermodynamics (2)
  - Fluid Dynamics (2)
- Mechanical Design (4)

Engineering Depth (4)

- See catalog for approved courses

Capstone (8)

**AHS/E! (28) (see Engineering Requirements)**  
**Electives (12) (see Engineering Requirements)**