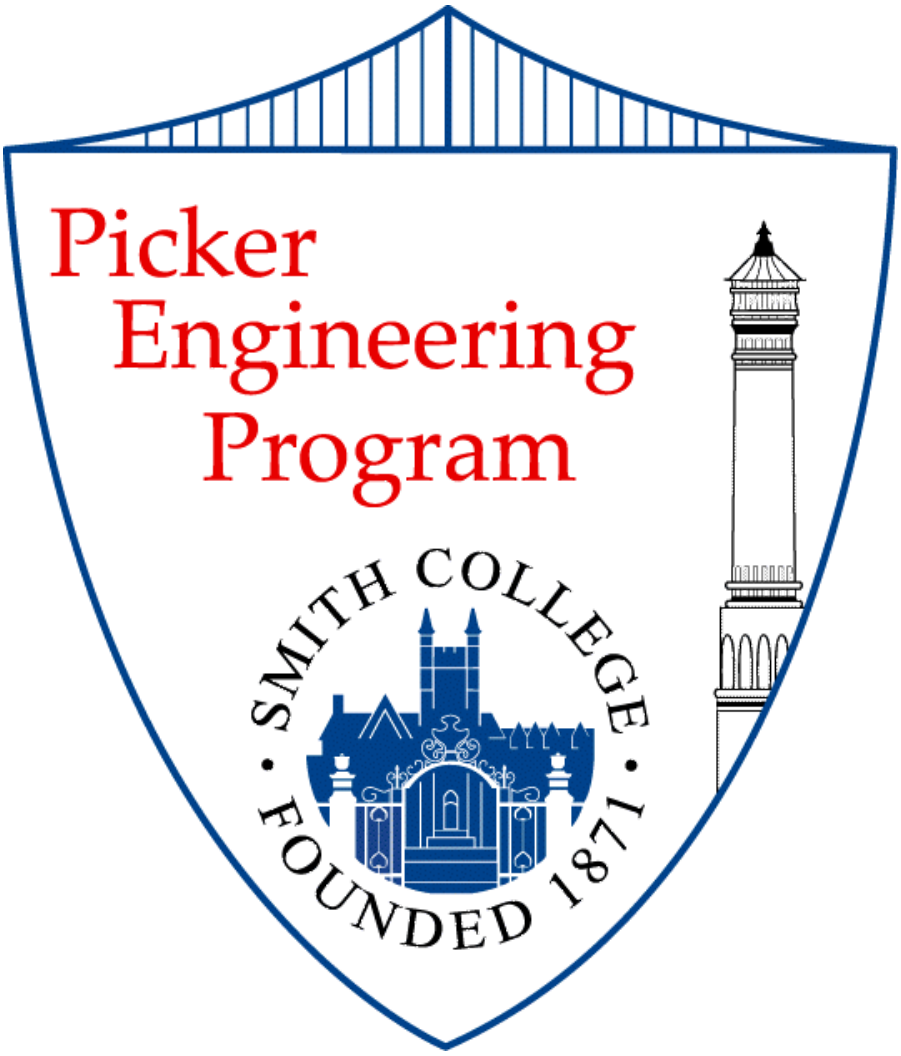
Guide to the Majors In Engineering



Web Site: http://www.smith.edu/engin

2011/12

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Engineering Faculty

Judith Cardell, Ph.D., *Associate Professor*
Research: Integrating renewable energy and smart grid technologies into the nation's power systems and electricity markets
Courses Taught: 100—Engineering for Everyone; 220—Engineering Circuit Theory; 325 – Electric Energy Systems; 326 – Dynamic Systems; CSC 103; CSC 111; CSC 249; CSC 270

Glenn Ellis, Ph.D., *Professor*
Research: Transforming engineering education by developing teaching approaches based on research about how people learn.
Courses Taught: 270 – Engineering Mechanics; 340 – Geotechnical Engineering; 389—Techniques for Modeling Engineering Processes, EDC 390—Teaching Science Engineering and Technology

Andrew Guswa, PhD., *Associate Professor*
Research: Modeling hydrologic process for people and eco systems.
Courses Taught: 100 – Engineering for Everyone; 315 – Ecohydrology; 346 – Hydrosystems Engineering; 363 – Mass & Heat Transfer; 374 – Fluid Mechanics;

Susannah Howe, *PhD., Senior Lecturer and Director of the Design Clinic*
Research: Facilitating engineering design and encouraging entrepreneurship.
Courses Taught: 410d – Engineering Design Clinic

Denise McKahn, Ph.D., *Assistant Professor*
Research: Renewable energy systems design and analysis; Dynamic systems and control
Courses Taught: 100 – Engineering for Everyone ; 110 – Fundamental Engineering Principles; 388 – Photovoltaic and Fuel Cell System Design

Borjana Mikic, Ph.D., *Professor and Director*
Research: Investigating structure/function relationships in skeletal tissues
Courses Taught: 100 – Engineering for Everyone; 372 – Advanced Solid Mechanics and Failure Analysis; 373 – Skeletal Biomechanics; 375 – Strength of Materials

Donna Riley, Ph.D., *Associate Professor*
Research: engineering education; gender and engineering; indoor air quality
Courses Taught: 205 – Science, Technology, and Ethics; 290 – Engineering Thermodynamics; 330 – Engineering and Global Development; 333 – Technological Risk Assessment

Paul Voss, PhD., *Associate Professor*
Research: Measuring air pollution transport and developing lighter-than-air flight systems.
Courses Taught: 100 – Engineering for Everyone; 312 – Atmospheric Processes; 374 – Fluid Mechanics; 377 – Aerial Vehicle Design

Susan Voss, Ph.D., *Associate Professor*
Research: Developing ways to improve hearing and monitor brain injury.
Courses Taught: 100—Engineering for Everyone; 220 – Engineering Circuit Theory; 320 – Signals and Systems; 321 – Digital Signal Processing; 322 – Acoustics; 380 - Neuroengineering

Visiting Faculty

Cloelle Giddings, Ph.D. (expected, 2011) *Instructor (two-year, part time appointment)*
Finishing her doctoral degree in Civil & Environmental Engineering at Cornell University. Graduated with B.S. in Engineering Science from Smith College in 2004 (our very first class!) Will be teaching EGR100 *Engineering for Everyone* in the fall and EGR110 *Fundamental Engineering Principles* in the spring.

Engineering Staff

Sue Froehlich, *Laboratory Supervisor*
Assists with all engineering lab courses and serves as a resource for student projects and the maintenance and use of major instrumentation in the Program.

Mary Morarity, Ph.D., *Assessment Researcher* (on leave at NSF for 2011-12)
Measures and assesses the influence of the curriculum and other scholarly endeavors on the Program's Educational Objectives and Student Outcomes.

Michele Schaft, *Program Assistant*
Coordinates many activities for the Program and faculty, including expense tracking and reimbursement, event scheduling, student employment and payroll.

Program Philosophy and Values

Introduction

The Picker Engineering Program at Smith College was founded in 1999 and is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410) 347-7700.

The study of engineering at Smith College is undertaken along with the study of humanities, arts, and sciences. This liberal arts education involves the acquisition of general knowledge to develop the ability for reasoned judgment and to prepare graduates to live full and rewarding lives. In a technologically rich era, engineering is an integral part of the liberal arts environment. Engineering, often referred to as the application of scientific and mathematical principles in the service of humanity, is the bridge that connects the basic sciences and mathematics to the humanities and social sciences.

To adequately address the challenges facing society in the 21st Century, there is a critical need for broadly educated engineers who can demonstrate adaptability to rapidly changing technologies and to increasingly complex multinational markets. Engineers must have the understanding needed to address the cultural, political and economic realities of our times along with the technical depth to appropriately frame complex problems using ethical reasoning. The preparation for such a path is argued to be best achieved in a liberal arts setting.

At Smith, the Engineering degrees offered are based on rigorous plans of study integrated with the liberal arts and sciences. There are two possible paths for the study of engineering at Smith College. The first is the ABET accredited B.S. in Engineering Science and the second is the B.A. in Engineering Arts (not accredited by any Commission of ABET). This guide is intended to present the details needed to answer the most practical questions regarding the study of engineering at Smith College along with the policies and practices of the Program and College. The *Guide to the Majors* should not be the singular input regarding a course of study. A rule of thumb that should guide all students in their approach toward undertaking the curriculum is to involve ones academic advisor and faculty in academic decision making.

B.S., Engineering Science

The degree of Bachelor of Science in Engineering Science is offered for those women who intend to practice professionally as engineers. The B.S. in Engineering Science is an ABET accredited degree that leads directly to the practice of engineering as a professional or to graduate study in engineering or a related field. Engineering Science encompasses the foundational scientific and engineering principles that govern the practice of all engineering disciplines. It is a multidisciplinary degree program designed to integrate the sciences and mathematics with engineering. Students are free to choose from a number of electives to pursue their area of technical interest after completing a foundational core. Integral components of this degree include the continuous emphasis on using engineering science principles in design and understanding the broad-based societal aspects of engineering design. An integrated curriculum of liberal arts, science and engineering courses provides the breadth and depth needed to think critically, act reflectively and make informed choices.

B.A., Engineering Arts

The non-accredited B.A. in Engineering Arts is offered for those women who do not intend to practice as engineers, but recognize the increasing importance of science and technology in today's world. The B.A. is not accredited by any Commission of ABET. The B.A. in engineering coupled with a focused set of studies in the liberal arts leading to a possible major or minor in the humanities, arts or sciences is particularly well suited course of study for preparing students to address the complexities

of the world in which we live. An additional major or minor is not required. A student may simply chose to explore the richness of the academic community that is Smith College by taking courses across the major fields of knowledge. Communicated through a reflective statement of focus, this course selection must demonstrate a central focus identified by the student.

Vision

Smith's Picker Engineering Program is unlike any other in the United States. It is designed to prepare women for leadership roles in society as well as in the engineering profession. The curriculum emphasizes the unity of knowledge across engineering subjects in a liberal arts context.

The program is marked by faculty excellence and innovation in both education and scholarship. Picker engineering students are creative and committed to academic rigor. Their education encompasses:

- Continuous self-discovery
- Effective communication
- Critical thinking
- Socially responsible decision-making
- Global citizenship as engineers of a sustainable future.

Mission

The mission of Smith's Picker Engineering Program is threefold:

1) To prepare Smith undergraduates for leadership roles in the profession of engineering and society in general by engendering
    - Reductive and integrative approaches to problem-solving
    - Deep conceptual understanding of engineering science fundamentals
    - Strong written, oral and visual communication skills
    - An ability to translate fundamental principles to design applications
    - A passion for continuous learning and self-improvement
    - Preparation for the professional practice of engineering
2) To cultivate a community of scholars at the college recognized programmatically and individually for contributions to the advancement of engineering practice and pedagogy.
3) To promote engineering within the context of a liberal education and as a profession in service to humanity.

Core Values

All of us in the Picker Engineering Program have a common goal: educating engineers who address the needs of people and the planet through the creative integration of engineering and the liberal arts. We offer the degree in engineering science because, in the best Smith tradition, we believe that engineers should think deeply and broadly about the effect their professional knowledge will have on the well-being of those whose trust they hold. Smith engineers hold the following core values:

Engineering is a connecting force among disciplines. In addition to learning essential principles, Smith engineering students understand the social, political, economic and environmental impact of their work. An integrated curriculum of liberal arts, sciences and engineering courses provides the breadth and depth needed to think critically, act reflectively and make informed choices.

Sustainability is not optional; it is essential. In a world of finite natural resources, Smith engineers understand sustainability and employ its principles in the practice of their profession.

Talented women must help shape our world. Our economic strength requires the full inclusion of women engineers at all levels of the profession. For more than 130 years, Smith alumnae have made outstanding contributions to their professions and communities, and Smith is recognized as one of the top institutions whose graduates earn their doctorates in the sciences.

Faculty and students collaborate in all aspects of learning. Our faculty are at the forefront of innovative learner-centered engineering education. Students are actively engaged in small classes, which promote intense discussions. Beyond the classroom, at informal dinners for pre-majors, casual lunches with study teams, and conversations in the halls or by e-mail, Smith engineering students enjoy unusual access to faculty. As undergraduates, they participate in meaningful research, hold a wide variety of internships, and often spend their junior year abroad.

Every student needs to be literate in engineering and science. As responsible citizens in today's society, all students must be technologically literate. The Picker Program offers courses that include engineering majors and non-majors; we all benefit from the inclusion of committed students with diverse skills and interests.

The Major:

B.S., Engineering Science

Requirements and General Guidelines

The value of more liberally educated engineers, who typically bring strong communication and abstract reasoning skills to their work, has been acknowledged broadly by corporate, research, government and not for profit communities. Consequently, the B.S. in Engineering Science is based on a rigorous plan of study integrated with the liberal arts in order to prepare Smith Engineers to ultimately work in roles requiring engineering expertise coupled with an understanding and ability to work in context.

Smith offers an undergraduate curriculum leading to an ABET accredited degree in Engineering Science: the study of the foundational scientific and engineering principles that govern the practice of all engineering disciplines.

An integral component of the Program is the continuous emphasis on the use of engineering science principles in design. This culminates in a final year-long design project in the Design Clinic that incorporates broad-based societal aspects. Students are encouraged to pursue a corporate and/or research internship to supplement their classroom instruction.

Engineers must be able to communicate effectively and work in team settings. Smith's highly-regarded writing intensive first year curriculum ensures that engineering students begin their engineering curriculum with appropriate communication skills that will be refined during the remainder of their studies. Virtually every engineering course offered at Smith incorporates elements of team-work and oral/written communication.

The minimum requirement to earn a Smith degree is 128 credits. Of the 128 credits, to major in engineering science, students must nominally complete 52 engineering credits (ABET minimum of 48), 35 credits of math and science (ABET minimum of 32), and 4 credits of Computer Science. In addition, students must satisfy a liberal arts breadth requirement via Latin Honors (20-24 credits of Art, Literature, Social Science, History, and Foreign Languages), or by completing a minor (or second major) in the Humanities (Division I) or the Social Sciences and History (Division II) (usually 24 cr).

The degree B.S., Engineering Science is an ABET accredited engineering degree. We have detailed the program educational objectives (attributes that Smith Engineers will posess five or more years after graduation) and program outcomes (attributes expected of a Smith Engineer at the time of graduation). These are given here for your consideration.

Program Educational Objectives

Smith College's engineering graduates will

1. Incorporate their knowledge and understanding of the natural sciences, humanities, and social sciences in the application of their engineering education.
2. Apply their engineering education in service to humanity
3. Enter the engineering profession or graduate school
4. Consider the impact of their professional actions on society
5. Demonstrate leadership in their personal and professional endeavors
6. Engage in continuous learning

Program Outcomes

According to the defined outcomes and performance criterion, graduates of the program will have demonstrated the following attributes:

1. Conceptual Analysis: a conceptual understanding of engineering science fundamentals
2. Mathematical Analysis: the ability to quantitatively analyze a component, process, or system using theoretical and empirical mathematics, and engineering tools [ABET a, e, k]
3. Experimentation: the ability to generate, evaluate, and understand data [ABET b, k]
4. Teamwork: the ability to collaborate effectively with individuals with different skills and perspectives [ABET d]
5. Communication: the ability to communicate effectively with a wide range of audiences using different modalities (visual, oral and written) [ABET g]
6. Ethics: the ability to think critically and act reflectively in relation to engineering ethics and professional responsibility [ABET f, h, j]
7. Life Long Learning: the ability to apply the fundamentals of how people learn to one's own education and life goals, and to use this knowledge to engage others in learning [ABET i]
8. Problem Framing: the ability to define, scope, and frame an open-ended problem [ABET c, e]
9. Design: the ability to apply knowledge of science, mathematics, and engineering to design a device, a system, a component or a process [ABET a, c]
10. Context: the ability to practice engineering in context, responsive to the needs of people and the planet [ABET h, j]

Please note that these Outcomes are mapped against ABET Outcomes a-k. For more detail please refer to the following link : http://www.abet.org/the_basics.shtml

Academic Advisors

Advisors for all engineering students are members of the Faculty. Typically, upon entering Smith, every student who has indicated a potential interest in engineering is assigned an engineering faculty member as a pre-major advisor. If you are interested in engineering and do not have an engineering faculty member as an advisor, please see the Director of Engineering for registration information and guidance. Each student is expected to meet with her advisor at least once a semester to discuss her academic interests and seek help in planning her courses and registering for classes.

Declaration of the Major

As soon as one decides to major in engineering science, a declaration of your major must be filed with the College. Generally, a potential major formally declares by the completion of the spring semester in her sophomore year. A formal declaration of the major must be submitted to the Class Deans office after having been approved by the faculty advisor. The form can be obtained via the Dean of the College's website, http://www.smith.edu/classdeans/ . To be assigned an engineering major advisor, please complete the departmental *Student Academic Advising* form available on the Program Moodle site or in hard copy from the Program Office in Ford Hall 155.

Requirements for the Major - B. S., Engineering Science

Math:	MTH 111 & 112 (or 114); MTH 241 or MTH245; select one from MTH 211, 212, or 222*, PHY210
Physics:	PHY 117**, PHY 118***
Chemistry:	CHM 111 or higher
Computer Science:	CSC 111
Engineering Core:	100, 110, 220, 270, 290, select three from (320, 326, 363, 374 and 375), 410 (8 credit Design Clinic)
Engineering Electives:	Three additional EGR courses, only one of which may be at the 200-level

*Physics 210 will be accepted as the prerequisite for MTH 222 in lieu of MTH 212

**Physics 117 is required for the major; however, students may meet this course requirement when guided to take Physics 115 and the one week engineering-physics problem solving course offered during each fall orientation period.

***Normally, students will take PHY 118. However, students may petition to substitute a science course in another discipline that is required for the major in that discipline. This petition must be approved by your advisor and the Program Director.

An important note about credits and accreditation requirements: if a student finds that she has been advised to take MTH112 or MTH114 but does not have 4 credits of AP (or equivalent) credit on her Smith transcript, she must take an additional math class to ensure that her total math and science credits reach a minimum of 32 credits. Similarly, on rare occasions, approved transfer classes may sometimes transfer in at fewer than the number of credits received if a course were taken at Smith. **It is the student's responsibility to ensure that she meets the ABET minimum of 32 credits of math and science (note that ABET does not consider computer science to be a basic science) and 48 ABET minimum credits of engineering coursework.**

Tiered Engineering Curriculum Structure:

The engineering curriculum is given schematically in Figure 1. The intention of the tiered curriculum is to clearly communicate the building of knowledge throughout the course of study and to give each student flexibility in her course choices. The foundational courses for the degree are EGR 100 *Engineering for Everyone* and EGR 110 *Fundamental Engineering Principles*, followed by three two-hundred level core courses (EGR 220 *Engineering Circuit Theory*, 270 *Engineering Mechanics*, and 290 *Engineering Thermodynamics)*. The three-hundred-level core is a set of 5 courses of which a student selects three. These courses are EGR 320 *Signals and Systems*; EGR 326 *Dynamic Systems;* EGR 363 *Mass and Heat Transfer*, EGR 374 *Fluid Mechanics*, and EGR 375 *Strength of Materials*. Please note that EGR 374 *Fluid Mechanics* is a prerequisite for EGR 363 *Heat and Mass Transfer*. EGR320 and EGR326 are offered in alternate years. Courses with a laboratory component that extends the in-class hands on learning activities include EGR 220, 270, 320, and 374. EGR 100 and EGR 410D are design-based courses with significant hands-on learning components. The work in these two classes is based on exploration and independent inquiry and as such is coupled to and considered a part of the laboratory/studio sequence.

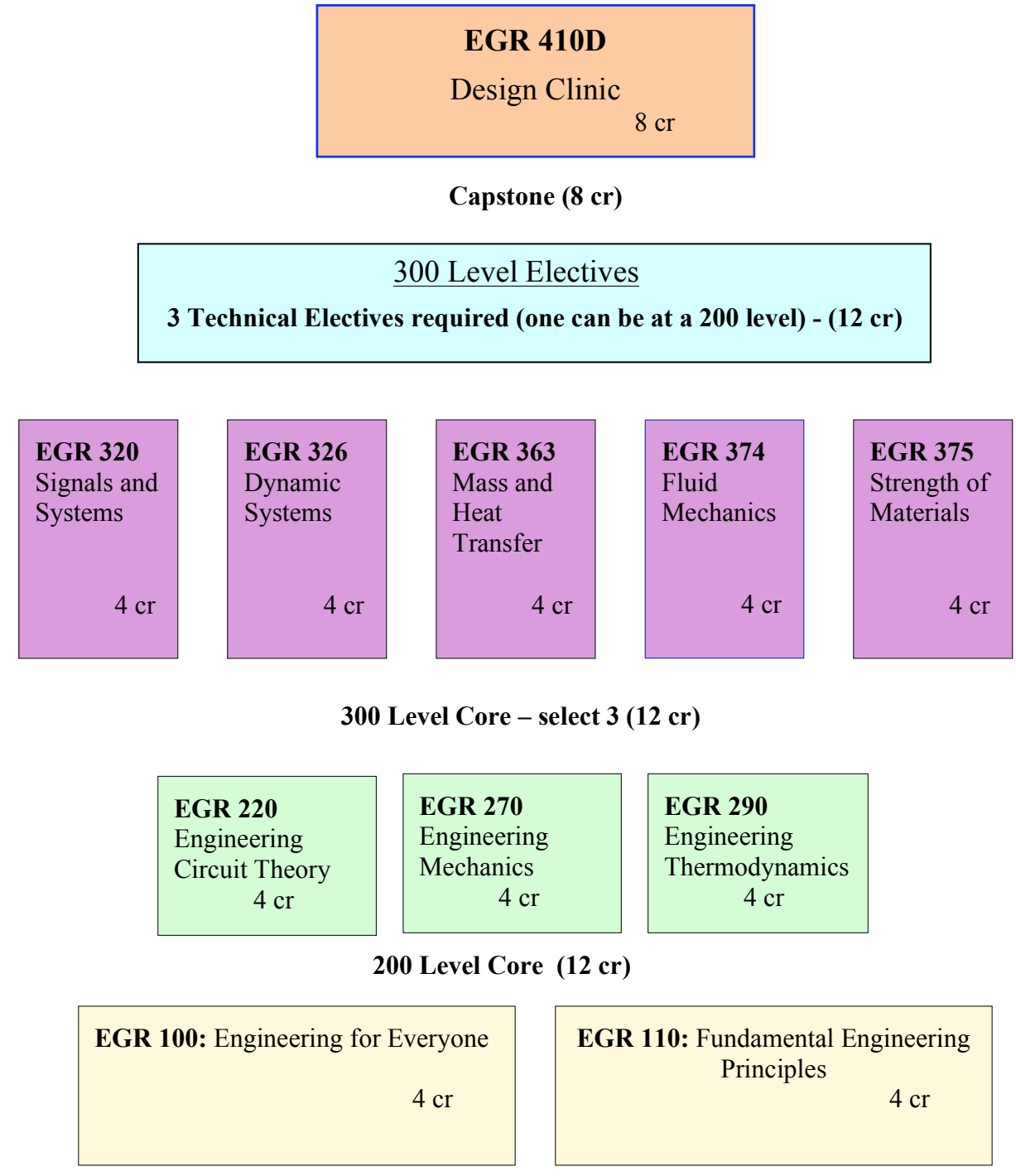

Figure 1. The core curriculum for the B.S., Engineering Science. The complementary science/math curriculum is 35 credit hours plus an additional 4 credits of Computer Science. Total engineering credit hours is 52. ABET EAC criteria requires 1.5 yrs of engineering courses or 48 credit hours of engineering topics consisting of engineering sciences and engineering design appropriate to the student's field of study. Additionally, 1.0 yrs (32 cr) of a combination college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. (Note that computer science is not considered a basic science by ABET).

Technical Electives: - Rationale for Developing Technical Depth

Students are required to demonstrate reasonable technical depth by developing a sequence of three thematically related engineering electives (two of which must be at the 300 level or higher). There must be a clear educational intention behind the selection of ones technical electives and for this reason these courses should be selected in consultation with the student's advisor. The course proposal or rationale behind the selection of the technical electives is documented on the back of the *Plan of Study* and with advisor approval.

Technical Depth – Area of Technical Interest

To demonstrate depth in her engineering major, every student must:

1. meet with her advisor to discuss a sequence of at least 3 engineering electives to be taken that form the basis of that student's area of technical interest,
   and
2. document the sequence and explain in writing her choice for demonstrating depth in her curriculum by discussing how her choices meet her personal educational goals. This is documented on the *Plan of Study*.

Courses offered by the program are given in Appendix A.
Several examples of elective course groupings are given in Appendix B. Please be advised that these are suggestions of possible technical areas and possible courses in each. The process here is to have you thoughtfully consider your interests and career objectives as you create a curricular path that enables you to gather additional knowledge, skills and abilities. Each student is expected to discuss her course selection with her advisor.

Liberal Arts Breadth:

Students are required to demonstrate breadth in their curriculum by either:

1. fulfilling the Latin Honors distribution requirements;
2. fulfilling the requirements for another minor (or 2nd major) within Div I or Div II; or
3. by submitting a cogent proposal describing an alternative approach including all courses that the student will take to acquire curricular breadth for consideration and approval by the engineering faculty and Program Director.

Mathematical Skills and Physics Requirements:

At its core, the fundamental language of engineering is mathematics; the stronger your mathematics background, the better prepared you will be to get the most out of your engineering coursework. Because we recognize that students come to Smith with a broad range of academic backgrounds, we have put several resources in place to help ensure that your math skills are as strong as they need to be in order to realize your full potential as an engineer.

If you are considering majoring in engineering (either the B.S. in Engineering Science or the B.A. in Engineering Arts), one of the requirements is PHY117, which you should take in the **spring** of your first year. Please note that there are two versions of introductory physics: PHY115 includes more review of algebra and calculus, while PHY117 assumes students are comfortable with those skills and uses the time to work on more advanced problem solving. Students in both PHY115 and PHY117 will be given a math assessment in the first week of the class to help determine which course is most

appropriate. **Please keep in mind that engineering majors are required to take PHY117. However, if your math assessment indicates that PHY115 is the more appropriate option for you, you may meet the PHY117 requirement by taking PHY115 and a one-week not-for-credit physics and engineering problem solving course that is offered during the orientation period prior to the start of your sophomore year.**

To give you the time to take advantage of Smith's resources, we have worked with the Department of Physics and the Spinelli Center for Quantitative Learning to set up the following opportunities for you.

In early November of your first year, a version of the math assessment that will be used in the first week of Physics will be available for you to take. Before the start of the course registration period for spring semester, you will be provided with individually tailored recommendations for addressing any weaknesses that may have been identified. These recommendations will include an initial assessment of whether you should take PHY117 or PHY115. Some of you may receive a strong recommendation to take MTH103, a 2-credit January-term Math Skills Studio. This class is available to you free of charge (with no additional cost for room and board). If you are unable to adjust your travel plans to take MTH103 and it has been strongly recommended to you, you can cover the same material by attending the Spinelli Center's Review Workshops, but you will not receive any academic credit for attending those. You will be given a similar math assessment at the start of your Physics course in the spring semester; by giving you the earlier assessment in November in addition to recommendations for improving specific math skills, it is our hope that your proficiency in algebra, trigonometry, and calculus will improve before the start of spring semester to the level needed for PHY117.

Historically, we have found that students who receive a C+ or below in PHY117 have a harder time with EGR270 *Engineering Mechanics*, which most students typically take in the fall of the sophomore year. Because EGR270 is a foundational course for many other courses in the engineering curriculum, we have put into place a one-week Physics and Engineering Problem Solving course during the August orientation period before the start of your sophomore year. **If you receive a C+ or below in PHY117, or if you took PHY115 (regardless of your grade in that course), you are required to take this one-week course.** The College covers the cost of your housing during this week, and it is available to you completely free of charge. Letters are sent out after spring semester grades have been turned in to let students know if they should plan on returning to campus a week early for this course as rising sophomores. It is a not-for-credit course that does not appear on your transcript.

Plan of Study

The Plan of Study is a living document that identifies the course work needed to complete the major and allows each student to document her path toward completing the major. It is a document that communicates to your advisor and faculty your academic record and the steps taken to complete each of the course requirements. Please note that the *Plan of Study* is not a formal record. It is a working record. However, a final version of your Plan of Study should be submitted with your *Certification of Completion of Requirements* in February of your senior year (see below).

The Engineering Program requires records of any deviation from the approved Smith Courses. Any time that a student takes a course away from the College for credit, it requires approval from both Engineering and the College to be accepted for the major. Additionally, course substitutions on campus require approval from the Engineering Program in order for these credits to be applied to the major. Please see your advisor and/or the Program Director for any guidance needed.

The purpose of the *Plan of Study* is to help you think about your academic career and plan appropriately. Students should complete and update the *Plan of Study* each semester and review and discuss this with their advisors.

Ultimately, your *Plan of Study* will indicate the fulfillment of your major requirements. During January of your senior year, the registrar will send a form know as the *Certification of the Completion of the Major.* This documents all courses that you have taken at Smith or have taken elsewhere to receive Smith credit. This is a formal document. After your careful review with your advisor, it is then submitted to the Program Director who will independently confirm that the major has been satisfied via your record. The *Certification of Completion of Requirements* form is then submitted to the registrar for final review and approval.

Organization of your plan of study:

To assist you in planning your courses, we have provided examples of possible course sequences fulfilling the *Plan of Study*. These examples identify ways to organize your courses to achieve a particular area of technical interest or organization of courses by semester in order to spend your junior year abroad. These examples are meant only as a guide to generate a discussion with your advisor. **You are encouraged to discuss your interests with your advisor and design a path that is consistent with your educational interests**. See Appendix C, Examples of Programs of Study.

Smith College
Picker Engineering Program

Engineering Science, B.S.
Plan of Study

August 2011

Name: _____ **Expected Date of Graduation:** _____

Student ID: _____ **Advisor:** _____

Math & Science Core

				Year/Term Taken	Transfer? (# of credits on transcript)	AP/IB? (# of credits on transcript)	Notes:
CHM	111	Intro. Chemistry (or higher)	(5 cr.)				
MTH	111	Calculus I	(4 cr.)				
MTH	112/114	Calculus II	(4 cr.)				
MTH	211, 212 or 222	Linear Algebra, Calculus III, or Differential Equations	(4 cr.)				
MTH	241 (or) 245	Probability & Statistics for Engineers **(or)** Practice of Statistics	(4 cr.)				
PHY	117	Advanced General Physics I	(5 cr.)				
PHY	210	Mathematical Methods of Physical Sciences and Engineering	(4 cr.)				
Other approved science course (normally, PHY118)							
(1) _____			(5 cr.)				

Subtotal Math/Science credits, nominally 35 cr (ABET min. = 32)

Note: if a student skips MTH 111 without 4 credits of AP/IB or a A-level exam credit appearing on her Smith transcript she must take an additional math class to have her total math and science credit hours meet the 32 credit ABET minimum. Similiarly, if transfer credits are used to fulfill math/science requirements and the credits granted are fewer than those associated with the Smith course, the student may need to take additional math or science, as appropriate, to satify the 32 credit math/science ABET minimium requirement.

Computer Science

CSC	111	Intro Computer Science (or higher)	(4 cr.)				

Engineering Core

				Year/Term Taken	Transfer? (# of credits on transcript)	Notes:
EGR	100	Engineering for Everyone	(4 cr.)			
EGR	110	Fundamental Engineering Principles	(4 cr.)			
EGR	220	Egr. Circuit Theory	(4 cr.)			
EGR	270	Engineering Mechanics	(4 cr.)			
EGR	290	Egr. Thermodynamics	(4 cr.)			
EGR	320*	Signals and Systems	(4 cr.)			
EGR	326*	Dynamic Systems	(4 cr.)			
EGR	363*	Mass and Heat Transfer	(4 cr.)			
EGR	374*	Fluid Mechanics	(4 cr.)			
EGR	375*	Strength of Materials	(4 cr.)			
EGR	410D	Design Clinic	(8 cr.)			
Three Engineering Technical Electives (3 minimum)						
(1) _____			(4 cr.)			
(2) _____			(4 cr.)			
(3) _____			(4 cr.)			

Subtotal Engineering credit hours, nominally 52cr (ABET min = 48)

***Pick 3 out of 5**

Note: if transfer credits are used to fulfill engineering course requirements and the credits granted are fewer than those associated with the Smith course, the student may need to take additional EGR courses to satify the 48 credit ABET minimium requirement for engineering content.

Liberal Arts Breadth: Latin Honors (20-24cr.) or minor/major in Div I or Div II (usually 24cr.)

			Year/Term Taken	Transfer? (# of credits on transcript)	Notes:
Latin Honors Option					
(A) Art	_____	____ cr			
(F) Language	_____	____ cr			
(L) Literature	_____	____ cr			
(H) History	_____	____ cr			
(S) Social Sci	_____	____ cr			

OR

Minor (or Major) in: _____

List at least 6 courses taken for the minor/major

(1)	_____	____ cr			
(2)	_____	____ cr			
(3)	_____	____ cr			
(4)	_____	____ cr			
(5)	_____	____ cr			
(6)	_____	____ cr			

Engineering Electives (Technical Depth)

Please list at least three engineering electives that you have chosen to provide technical depth in a particular area and explain why you have chosen these courses

Other Approved Science Course for Credit

Normally, students will take PHY 118. However, students may petition to substitute a science course in another discipline that is required for the major in that discipline. This petition must be approved by your adviser and the Program Director.

Print Student Name	**Student Signature**	Date
Print Advisor Name	**Advisor Signature**	Date
Director	**Director Signature**	Date

The Major

B.A., Engineering Arts

Course Requirements and General Guidelines

Academic Advisors

Advisors for all engineering students are members of the Faculty. Typically, upon entering Smith, every student who has indicated a potential interest in engineering is assigned an engineering faculty member as a pre-major advisor. If you are interested in engineering and do not have an engineering faculty member as an advisor, please see the Director of Engineering for registration information and guidance. Each student is expected to meet with her advisor at least once a semester to discuss her academic interests and seek help in planning her courses and registering for classes.

Declaration of the Major

As soon as one decides to major - B.A., Engineering Arts, a declaration of the major must be filed with the College. Generally, a potential major formally declares by the completion of the spring semester in her sophomore year. A formal declaration of the major must be submitted to the Class Deans office after having been approved by the faculty advisor. The form can be obtained via the Dean of the College's website, http://www.smith.edu/classdeans/ . Please see the plan of study section of this *Guide* for additional information. To be assigned an engineering major advisor, please complete the departmental *Student Academic Advising* form available on the Program Moodle site or in hard copy from the Program Office in Ford Hall 155.

The Purpose of the B.A. in Engineering Arts

The B.A. in Engineering Arts is offered for those students who do not intend to professionally practice as engineers, but who recognize the increasing importance of science and technology in today's world. The B.A. is not accredited by any Commission of ABET. Those students interested in obtaining an accredited engineering degree should pursue the B.S. in Engineering Science.

The Importance of the Liberal Arts

The B.A. in engineering coupled with a focused set of studies in the liberal arts leading to a possible major or minor in the humanities, social sciences, or sciences is particularly well suited for preparing students to address the complexities of the world in which we live. An additional major or minor beyond the B.A. in Engineering Arts is not required; a student may choose to explore the richness of the academic community that is Smith College by taking courses across the major fields of knowledge. This course selection must have a central focus or rationale that is identified by the student and is articulated in her *Statement of Focus*.

Requirements for the Major – B.A., Engineering Arts

The major requires a total of 12 courses (or the equivalent).

Science Sequence:	PHY 117 and one other science course[1]
Math:	MTH 111 and 112 or 114 (or equivalent), and PHY 210[2]
Engineering Core:	EGR 100, 110, 220, 270 and 290
Engineering Electives:	Two 300 level or higher engineering courses. Course substitutions require approval of the advisor and Director of Engineering.

Statement of Focus:	A statement of focus is required for the major. The student's academic adviser will assist her in contextualizing her course choices.

[1] Physics 117 is a prerequisite for EGR 270. The other science course is to be chosen by the student upon consultation with her major advisor.

[2] These mathematics courses are prerequisites for the required B.A. engineering core.

A Statement of Focus

A statement of academic focus that identifies the student's educational objectives shall accompany a declaration of the major for the degree of B.A. in Engineering Arts. This statement shall detail the student's choice of approximately six (6) additional courses that provide a coherent context for the major in engineering arts, both in terms of her understanding of engineering in a broader liberal arts context and in terms of her educational objectives. The documentation of this focus should accompany the student's *Plan of Study*.

For example, potential focus areas might include the arts (Architecture or Landscape Studies) or education. A teaching certificate can be earned through the Department of Education and Child Study, which offers a licensure program for technology and engineering (grades 5-12) that is transferable to other states. A focus in health sciences is ideally suited for students who wish to pursue their interests in engineering while satisfying pre-medical requirements. Additional areas of focus include public policy, economics, energy policy, ethics, and global development.

Development of a Focus:

All students who pursue the B.A. in Engineering Arts must provide a statement of educational focus. A second major or minor in the Liberal Arts is not required. The faculty of the Picker Engineering Program recognizes the importance of multiple pathways through the program and will work with the student to help her develop an area of focus. A draft example for energy policy is shown below.

Focus Area Example: Energy Policy

- The two, 300-level EGR courses selected by the student should relate to energy, energy systems, electricity, etc.. (EGR325, 388, etc…)
- 3 of the following economics courses
  - ECO 150: Intro microeconomics
  - ECO 250: Intermediate microeconomics
  - ECO 153: Intro macroeconomics
  - ECO 284: Environmental economics
  - ECO 211: Economic development
  - ECO 233: Free market economics
- 3 of the following government courses
  - GOV 207: Public policy
  - GOV 220: Intro to comparative politics
  - GOV 241: International politics
  - GOV 242: International political economy
  - GOV 244: US foreign policy
  - GOV 254: Colloquium: Politics of the global environment

Plan of Study

The *Plan of Study* is a living document that identifies the course work needed to complete the major and allows each student to document her path toward completing the major. It is a document that communicates to your advisor and faculty your academic record and the steps taken to complete each of the course requirements. Please note that the *Plan of Study* is not a formal record. It is a working record. All formal records are kept in the Registrar's Office. Additionally, the Engineering Program requires records of any deviation from the approved Smith Courses. Any time that a student takes a course away from the College for credit, it requires approval from both Engineering and the College to be accepted for the major. Additionally, course substitutions on campus require approval from the Engineering Program in order for these credits to be applied to the major. Please see your advisor and/or the Program Director for any guidance needed.

The purpose of the *Plan of Study* is to help you think about your academic career and plan appropriately. Students should complete and update the *Plan of Study* each semester and review and discuss this with the advisor.

Ultimately, your *Plan of Study* will indicate the fulfillment of your major requirements. During January of your senior year, the registrar will send a form known as the *Certification of the Completion of the Major.* This documents all courses that you have taken at Smith or have taken elsewhere to receive Smith credit. This is a formal document. After your careful review with your advisor, it is then submitted to the Program Director who will independently confirm that the major has been satisfied via your record. The *Certification of Completion of Requirements* form is then submitted to the registrar for their review and approval.

Smith College
Picker Engineering Program

B.A., EngineeringArts
Plan of Study

August 2011

Name: _____ **Expected Date of Graduation:** _____

Student ID: _____ **Advisor:** _____

Math & Science Core

				Year/Term Taken	Transfer? (# of credits on transcript)	AP/IB? (# of credits on transcript)
MTH	111	Calculus I	(4 cr.)			
MTH	112/114	Calculus II	(4 cr.)			
PHY	117	Advanced General Physics I	(5 cr.)			
PHY	210	Mathematical Methods	(4 cr.)			
Additional Science elective						
(1)			(5 cr.)			

Total Math & Science Credit Hours (22 cr.)

Engineering Core

EGR	100	Engineering for Everyone	(4 cr.)		
EGR	110	Fundamental Engineering Principles	(4 cr.)		
EGR	220	Egr. Circuit Theory	(4 cr.)		
EGR	270	Engineering Mechanics	(4 cr.)		
EGR	290	Egr. Thermodynamics	(4 cr.)		
Two 300-level Engineering Electives:					
(1)			(4 cr.)		
(2)			(4 cr.)		

Total Engineering Credit Hours (28 cr.)

Statement of Academic Focus

Please provide a statement explaining how your courses outside the major fit together with your interests within engineering as part of a bigger picture vision for your undergraduate education. At a minimum, identify six courses outside the major that provide a coherent context for the major in engineering arts.

update: 08/08/11 by ms

The Minor in Engineering

A student who seeks to obtain a minor in Engineering should have a clear educational intention behind her choice to do so. It is recommended that each student take a thoughtful approach to her course selection and consider taking her thematically related courses in order to obtain some technical depth. As always, it is strongly recommended that the course selection be undertaken in consultation with ones advisor.

The requirements for the minor in engineering comprise a total of five (5) courses. These courses must include:

1. PHY 117
2. EGR 100
3. One course from: PHY 210, MTH 211, MTH 212, MTH 222, MTH 241, MTH 245, EGR 110, 220, 270, 290
4. One course from: EGR110, 220, 270, 290, 320, 326, 363, 374, 375 (not the same as above)
5. One course from: EGR 312, 315, 320, 325, 326, 330, 333, 340, 346, 363, 372, 373, 374, 375, 377, 388, 389, 390, 410d, and other 300-level EGR courses a they are added (not the same as above)

Please note that MTH 111 and MTH 112 (or MTH114) are prerequisites to certain engineering courses listed above.

Academic Advisors

Advisors for all students in the minor are members of the Faculty. Typically, upon entering Smith, every student who has indicated a potential interest engineering is assigned a pre-major advisor from among the engineering faculty. Each student is expected to meet with her minor advisor at least once a semester to discuss her academic interests and seek help in planning her courses and registering for classes.

General Information Related to the Majors:

Engineering Moodle Site

All students enrolled in EGR courses will automatically be enrolled in the Picker Engineering Program Moodle site. This site is used as our primary means for communicating with engineering students, and also holds all of our up-to-date departmental forms as well as the Guide to the Majors. Please note that forms are no longer kept on the Picker Engineering Program web site.

Advanced Placement

Some students interested in engineering will enter Smith College having taken Advanced Placement (AP) examinations in one or more topics. Smith participates in the Advanced Placement Program administered by the College Entrance Examination Board. In addition to reading below, please refer to the Academic Rules and Procedures section of the College Catalogue Bulletin for information governing eligibility for and use of AP credits.

AP credits that meet the requirements outlined by the College are recorded as prematriculation credit and recorded on the student's Smith transcript (a score of 4 or 5 is necessary). The following table is a set of recommendations for course equivalents and substitutions based on AP credit achieved.

These guidelines should be **reviewed with your pre-major and /or major advisor**, and in some cases, **with the faculty teaching the course in the respective departments**. Students entering with credit from AP exams in Calculus BC, Chemistry, Computer Science or Physics (C only) are not *required* to take any further courses *in those subjects* to satisfy the requirements for the engineering major, though they are *strongly encouraged* to take additional courses in these areas.

AP EXAM Score of 4 or 5	**Equivalent Smith Course(s)**	**Guidelines for the first course in subject area to be taken at Smith** i.e "Placement"
Calculus AB	MTH 111	MTH 114
Calculus BC	MTH 111 & 112	PHY 210
Chemistry	CHM 111	Chemistry requirement satisfied.
Computer Science (A or AB)	CSC 111	Computer Science requirement satisfied
Physics B	None	PHY 117
Physics C	PHY 117 & 118	EGR 270 or as advised by the Physics faculty

Pre-matriculation Credit for International Baccalaureate and Cambridge A Levels:

A memorandum of understanding has been established between the Picker Engineering Program and Smith College. The Picker Engineering Program shall accept Cambridge A levels and International Baccalaureate (IB) work at the diploma level as pre-matriculation credit. The department will work with the registrar to have this portion of each engineering student's incoming academic record read and assessed for credit prior to the start of the first year. This work may be used toward the degree and will be recorded on the student's transcript. As such, it will be used in the same way as AP credit is currently used toward the B.S. degree requirements.

For credit to be applied toward the degree it must be recognized and recorded by the Registrar's Office.

Approval for Courses Taken at Other Institutions & Transfer Credits

From time to time, a student may wish to take classes at other institutions for summer school, junior year away, Five College Study (often UMASS), etc. **It is imperative that you discuss this with your advisor and obtain approval for these courses prior to taking them.** The form *"Departmental Supplement to Petition for Transfer Credit"* **must include**:

1. the name of the institution where you will be studying,
2. a syllabus from the course including:
   - the name of the text and course description,
   - the topics covered in the course and the course outcomes,
3. an official copy of your transcript (upon completion of the course or, if transferring to Smith, during the application process).

To ensure that the courses are added to your Smith Transcript, attach the departmental supplement form with the requisite approvals (advisor and Program Director) to the College form *"Smith College Petition for Transfer Credit."* A list of courses that engineering students have taken at other institutions in the past can be found at in the Program Office (Ford Hall 155).

Additionally, some students will transfer to Smith from other schools. As part of the application process, they should include the same information as listed above for *all courses* for which credit is sought towards the engineering degree. This information must be provided in order to evaluate those credits that will count towards the major requirements and determine the remaining credits necessary to receive a Smith degree in Engineering. Only grades of **C** or better will be accepted for transfer credit.

Special Studies

The Program encourages all students to undertake independent research.
From time to time a student may want to study or research a topic for which there is no formal course offering. This is possible under the guidance of a faculty advisor through a special studies course. In essence, this is a self-designed course with faculty oversight. Students interested in registering for a special studies course should discuss it with their advisor and develop several paragraphs outlining the goals of such a course, and listing the outcomes to be achieved. This information should be included on the departmental form, *"Departmental Supplement for Special Studies / Honors Thesis Registration."*

Please note that credits taken as special studies credit are elective credits in the major. However, they require formal approval to be substituted for course work as a student's technical elective credit.

The process for approval of special studies work to count as a technical elective is as follows:

1. Submit a *Departmental Supplement* form with a short description of the project. Identify on this form that you want technical elective credit for the course. This description must have the objective for the special studies identified and mapped against the Program's ABET outcomes. To do this one would work with the faculty member sponsoring the special studies and identify the deliverables (evidence) for achieving these outcomes. Only 2 or 3 outcomes are needed.

2. Meet with your faculty advisor to discuss and document how your special studies work helps you achieve your educational objectives. In the documenting of this you will want to give your advisor some signed record regarding how your special studies enables you to meet your educational objective in a manner that cannot be achieved via the course work available to you.

3. Get the approval of your advisor, the faculty sponsor (director of your special studies work) and submit these approvals on the *Departmental Supplement* form to the Program Director. The form specifically identifies whether or not you intend to take the work on as a technical elective (TE). Once the Program Director reviews your petition, this request is then taken to the faculty for approval at the earliest possible time in the semester. Program Faculty approval is necessary for one to receive technical elective credit for Special Studies work. Time is of the essence here as one would want to obtain this approval from the faculty in the add period of the semester.

Departmental Honors Program

For students who wish to pursue a topic in-depth and undertake research within Engineering, they may do so through participation in the Honors Program. The Departmental Honors Program allows a student with a strong academic background to do independent and original work. This provides recognition in the major for students who do work of high quality in their course work and in the preparation and presentation of their research. The culmination of the work is a written thesis, oral presentation and defense of the thesis under the direction of an Engineering Program faculty member. To be eligible to apply to participate in the Honors Program, students must have a 3.3 average for all engineering, math, science, and computer science courses through the junior year and a 3.0 average for courses outside those listed above through the junior year. Successful completion of work in the honors program leads to the awarding of the Bachelor of Science degree with the added notation "Honors", "High Honors" or "Highest Honors" in Engineering Science or a similar designation for the B.A. in Engineering Arts.

You must review "Engineering Program Honors Guidelines" in Appendix D1 as well as the Smith College Guidelines for the Departmental Honors Program (Appendix D2). Smith's Subcommittee on Honors and Independent Programs (SHIP) oversees this program college-wide. The college guidelines can be found on the Smith Class Dean's website:
http://www.smith.edu/classdeans/honors_program.php

Please note that each Honors Proposal is approved by the engineering faculty at the first engineering program meeting of the fall semester. Your proposal must be submitted in advance of this meeting for a reading by the faculty (by 5pm on September 12, 2011). The first faculty meeting of the year typically occurs during the second week of the semester. This will allow just enough time for departmental approval prior to the submission to the Subcommittee on Honors and Independent Projects.

Junior Year Away – Princeton-Smith exchange

An exchange program between Princeton University and Smith College permits students from Smith's Picker Engineering Program to study at Princeton and engineering students from Princeton to study at Smith. Both programs share the goal of producing leaders for the 21st century and the belief that successful engineers can identify the needs of society and direct their talents toward meeting them. The exchange will afford students on both campuses the opportunity to have a rich experience in a social and academic environment that differs considerably from that of their home institution.

Smith students will typically exchange to Princeton for the Spring semester of their junior year. The deadline for the Smith-Princeton Exchange application is in October for the following Spring, and students will be notified in November. Please note that there is a deadline of **December 1 to notify**

the College if you are going to be off campus for the Spring semester. See Appendix E for guidelines and consult with Prof. Andrew Guswa for more detailed information, including deadlines.

Junior Year Away – Study Abroad

Students are encouraged to consider acquiring a portion of their academic career abroad to enrich their educational experience. A number of approved international programs already exist in all regions of the world. There are courses available at respected universities around the world that can be applied to the engineering major. Sufficient flexibility exists in the engineering curriculum should a student wish to study in a non-English speaking country. Proper preparation and selection of courses will require diligent and informed counseling, which the engineering faculty is prepared to offer. If a student is considering study abroad and plans to go to a non-English speaking country, often she will need to take a foreign language her first year and therefore must begin discussions and planning with her pre-major advisor.

Every fall, the Office for International Study holds a study abroad fair. This is an opportunity to meet program representatives. Additionally the office conducts information sessions throughout the academic year every Monday at 4:00. More information can be found in the Global Studies Center in Wright Hall.

For more information on study abroad, the list of study abroad approved programs, and the guidelines and college forms visit the website for the Office of International Study:
http://www.smith.edu/studyabroad

In addition to the required College forms necessary to study abroad, there is another form, *"Departmental Supplement to Petition for Transfer Credit"* that is required by the Engineering Program. The supplemental departmental form is necessary in order to evaluate the courses you plan to take abroad and determine that there is sufficient comparability when seeking to meet Smith Engineering Program requirements. **It is critical that you discuss this with your advisor and obtain approval for these courses prior to taking them, especially if you are going to use these towards your major.**

The form *"Departmental Supplement to Petition for Transfer Credit"* **must include**:

1. the name of the institution where you will be studying,
2. a syllabus from the course including:
   - the name of the text and course description,
   - the topics covered in the course and the course outcomes,
3. an official copy of your transcript (upon completion of the course or, if transferring to Smith, during the application process).

Please note that the application **deadlines to study abroad in your Junior year, are in February of the Sophomore year, so advanced planning is imperative** Note this is for both Fall or Spring Semesters or full year.

The approved study abroad program is distinct from the long-standing Smith Junior Year Abroad (JYA) Program with sites in Geneva, Paris, Florence and Hamburg. JYA is a Smith administered program directed by Smith faculty. Like most of the approved study abroad experiences all coursework is in the host country language. Special arrangements are necessary for engineering students to participate in some sites of the Smith JYA Program. Contact the Office of International Study and the Engineering JYA faculty advisor (Prof. Judy Cardell) if you are interested in studying at these sites.

Engineering Study Abroad Application Steps

1. Investigate information at the Study Abroad office

- The engineering department does not duplicate the information that is available at the study abroad office, including program avialability and basic program information.

2. Research courses to take abroad

- Gradually develop a list of courses that you would like to take abroad and make sure they will allow you to complete your EGR major.
    - No courses are guaranteed to be offered, either abroad or at Smith, in the semester you hope to take them, so *you must have contingency plans*. (*i.e.,* backup courses that will allow you to complete the major)
- Use the online resources from your school of interest
- Talk with other students
- Check the listing of courses available on the Picker Engineering Program (PEP) Moodle site.
    - Note that the courses previously approved are *likely* to be approved again, but you do need to find the course information so we can ensure the course has not changed since it was previously approved for a different student

3. Gather forms and supporting documentation

In addition to the Smith College study abroad paperwork, you must:

- Complete the Plan of Study, for the BA or BS, available on the PEP Moodle site
- Complete the "Petition Form (Transfer Credit, Special Studies, etc..)" on the PEP Moodle site FOR EACH COURSE taken away toward the EGR major
- Provide information on each course proposed for the EGR major to: (1) your advisor and (2) the engineering JYA advisor (Prof. Cardell)
    - A syllabus, or at the minimum a course description that clearly states the topics covered in the course
    - Level of course – first, second, third-year course
        - Prerequisites will often help indicate the course level
        - The course you are taking must be the same level as the course you want to substitute
    - Laboratory included?
        - For core EGR courses at Smith that have a lab, we require that any substitute course also have a lab
        - This includes EGR 220, EGR 270, EGR 320, EGR 374
- Note that courses you would like to take may not be approved, if they do not meet the above requirements or if you cannot find the information that demonstrates that the requirements are met.

4. Deadlines

- The JYA application is due in the middle of February. You need to have all the paperwork ready to be signed at least one week before the deadline, so that you have time to fix any problems that are found.

Additional Enrichment Opportunities

Research / Internships

Students are encouraged to pursue research with Smith faculty and external internship / research opportunities to supplement their course work. These can begin as soon as the summer of your first year, but more typically the summer of your sophomore and junior years. This is an excellent way to gain exposure to the field, gain practical applications of your academic studies, explore career options and gain valuable work experience. It allows you to refine your thinking and explore your areas of interest. Students are further encouraged to take full advantage of the services offered by the Career Development Office (CDO) http://www.smith.edu/cdo/.

Career and information specifically focused on engineering opportunities may be found on the following link: http://www.smith.edu/cdo/students/career/engineering.html.

Praxis Internship

The Smith College program, "Praxis: The Liberal Arts at Work", funds students to work at substantive, unpaid summer internships related to their academic and /or career interests. Since 70% of the internships available are often unpaid, this is a very valuable resource for a student. This program is administered through the CDO and available to all students once during their four years at Smith. All students are encouraged to explore this opportunity. Please visit the Career Development Office for more information: http://www.smith.edu/cdo/students/praxis/index.html

Master Tutors and Graders

There are opportunities for students who have performed well in their courses to assist their classmates and faculty by becoming master tutors and / or graders for that course in subsequent years. Master tutors augment the help provided by faculty by being available regularly to assist other students with questions they may have about material in a particular class. Graders assist the faculty with the administration of problem sets and / or exams. If you did well in a particular class and think you would enjoy helping your classmates and faculty, contact the faculty who taught that particular course to let them know of your interest. General training is available through the Jacobson Center to become a tutor.

Jacobson Center

The Jacobson Center offers students several services aimed at enabling them to make the most of their education. These services include writing counseling; the opportunity to use student tutors or serve as a student tutor; and workshops on time management, study skills, and other academic issues. http://www.smith.edu/jacobsoncenter/

FE Exam

As you prepare to graduate, all engineering students will be encouraged to take the Fundamentals of Engineering ("FE") Exam. The FE is a standardized exam and is the first step you must take if you wish to gain professional licensure in engineering. The deadline to register for the exam is in February and the exam is taken in April. Review materials can be found in Young Science Library. The application and information about the exam can be found at:
http://www.pcshq.com/pcsweb/pcspages.nsf

Student Engineering Organizations

There are several national engineering organizations that would welcome your participation and involvement. There are some with whom we are already affiliated and others where we are just now organizing student chapters. The organizations are typically student run, with student boards and officers.

The Society of Women Engineers (SWE): http://www.swe.org

The Society of Women Engineers, founded in 1950, is a not-for-profit educational and service organization. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders. Goals include: informing young women, their parents, counselors, and the general public of the qualifications and achievements of women engineers and the opportunities open to them; serving as a center of information on women in engineering; and encouraging women engineers to attain high levels of education and professional achievement. Contact the current president of our student chapter for more information.

National Society of Black Engineers (NSBE): http://www.nsbe.org

NSBE had its genesis at a national conference planned and hosted by the Society of Black Engineers at Purdue University in April 1975. NSBE's mission is to increase the number of culturally responsible Black engineers who excel academically, succeed professionally and positively impact the community. Objectives of the organization are to stimulate and develop student interest in the various engineering disciplines; strive to increase the number of minority students studying engineering at both the undergraduate and graduate levels; encourage and advise minority youth in their pursuit of an engineering career; promote public awareness; and function as a representative body on issues and developments that affect the careers of Black Engineers. Contact the current president of our student chapter for more information.

Engineers for a Sustainable World (ESW): http://www.esustainableworld.org

Engineers for a Sustainable World (formerly Engineers without Frontiers) is a nonprofit organization with a network of professionals and students working to reduce poverty and improve global sustainability. Through domestic and international development work, education, and public outreach, ESW mobilizes engineers to address the challenges of global poverty and sustainability. ESW embers and volunteers are building a better future by developing innovative technologies, shaping policy, and fostering small-scale enterprise, improving lives and building a more sustainable world. Goals are to mobilize engineers to address the unique challenges of developing communities and to promote global sustainability; build social capital by creating multi-sector partnerships and increasing local ownership of community development programs; educate a generation of engineers to have greater understanding of global issues and the way technology can be employed for human progress; and promote a positive image of engineering through outreach, service, and

international goodwill. Contact the current president of our student chapter for more information.

Tau Beta Kappa (TBK) –

TBK is Smith's name for the probationary chapter of the National Engineering Honor Society, Tau Beta Pi (TBP). It recognizes engineering students who excel academically and who demonstrate service to the community. Each year the group commits to a community service activity / project. The chapter is run by students according to the rules governing TBP and advised by faculty. Juniors in the top 1/8 and seniors in the top 1/5 of their respective classes are invited to participate, according to the national TBP guidelines. Professor Glenn Ellis is the faculty advisor.

Tau Beta Pi is the only engineering honor society representing the entire engineering profession. It is the nation's second-oldest honor society, founded at Lehigh University in 1885 to recognize students of distinguished scholarship and exemplary character. There are now collegiate chapters at 230 US colleges and universities, active alumnus chapters in 16 districts across the country, and a total initiated membership of over 480,000.

Appendices A through E

Appendix A – Courses Offered in the Major

Appendix B - Examples of Thematic Elective Course Groupings

Appendix C – Examples of Programs of Study

Appendix D.1 - Engineering Program Honors Guidelines

Appendix D.2 – College Guidelines for the Departmental Honors Program

Appendix E – Princeton-Smith Exchange Guidelines

Appendix A - Courses Offered

CORE COURSES

100 Engineering for Everyone

EGR 100 serves as an accessible course for all students, regardless of background or intent to major in engineering. Engineering majors are required to take EGR 100 for the major, however. Those students considering majoring in engineering are strongly encouraged to take EGR 100 in the fall semester. Students will develop a sound understanding of the engineering design process, including problem definition, background research, identification of design criteria, development of metrics and methods for evaluating alternative designs, prototype development, and proof of concept testing. Working in teams, students will present their ideas through oral and written reports. Reading assignments and in-class discussions will challenge students to critically analyze contemporary issues related to the interaction of technology and society. **{N}** 4 credits
Paul Voss, Cloelle Sauseville-Giddings, Fall 2011
Donna Riley Spring 2012
Offered every Fall and Spring

110 Fundamental Engineering Principles

(Formerly EGR 260) The design and analysis of engineered or natural systems and processes relies on a command of fundamental scientific and engineering principles. This course provides an introduction to these fundamental underpinnings through a study of the conservation of mass, energy and charge in both steady and transient conditions with non-reactive systems. Specific topics covered will include a review of process variables and their relationships, open and closed systems, differential and integral balances, and basic thermodynamics. Prerequisites: MTH 112 or 114 (may be concurrent). **{N}** 4 credits
Cloelle Sausville-Giddings
Offered every Spring

220 Engineering Circuit Theory

Analog and digital circuits are the building blocks of computers, medical technologies, and all things electrical. This course introduces both the fundamental principles necessary to understand how circuits work and mathematical tools that have widespread applications in areas throughout engineering and science. Topics include: Kirchhoff's laws, Thévenin and Norton equivalents, superposition, responses of first-order and second-order networks, time-domain and frequency-domain analyses, frequency-selective networks. Prerequisites: PHY117, PHY 210 or equivalent (PHY210 can be co-requisite) or permission of the instructor. Required laboratory taken once a week. **{N}** 4 credits
Susan Voss
Offered every Fall

220L – Circuit Theory Laboratory

Co-requisite for Engineering Circuit Theory

270 Engineering Mechanics

This is the first course in a two-semester sequence designed to introduce students to fundamental theoretical principles and analysis of mechanics of continuous media, including solids and fluids. Concepts and topics to be covered in this course include conservation laws, static and dynamic behavior of rigid bodies, analysis of machines and frames, internal forces, centroids, moment of inertia, vibrations and an introduction to stress and strain. Prerequisite: PHY 117, MTH 112 (or the equivalent) or permission of the instructor. Required laboratory taken once a week. **{N}** 4 credits

Glenn Ellis
Offered every Fall

EGR270L Engineering Mechanics Laboratory
Co-requisite for Engineering Mechanics.

290 Engineering Thermodynamics
Modern civilization relies profoundly on efficient production, management, and consumption of energy. Thermodynamics is the science of energy transformations involving work, heat, and the properties of matter. Engineers rely on thermodynamics to assess the feasibility of their designs in a wide variety of fields including chemical processing, pollution control and abatement, power generation, materials science, engine design, construction, refrigeration, and microchip processing. Course topics include: first and second laws of thermodynamics, power cycles, combustion and refrigeration, phase equilibria, ideal and non-ideal mixtures, conductive, convective, and radiative heat transfer. Prerequisites (or co-requisites): EGR 110 (formerly 260) and PHY 210 (or the equivalents) or permission of the instructor. **{N}** 4 credits
Donna Riley
Offered Every Fall

320 Signals and Systems
The concepts of linear system theory (e.g., Signals and Systems) are fundamental to all areas of engineering, including the transmission of radio signals, signal processing techniques (e.g., medical imaging, speech recognition, etc.), and the design of feedback systems (e.g., in automobiles, power plants, etc.). This course will introduce the basic concepts of linear system theory, including convolution, continuous and discrete time Fourier analysis, Laplace and Z transforms, sampling, stability, feedback, control, and modulation. Examples will be utilized from electrical, mechanical, biomedical, environmental and chemical engineering. Required concurrent laboratory. Prerequisites: EGR 220 and PHY 210. **{M}** 4 credits
Susan Voss
Not Offered in 2011-2012

320L Signals and Systems Laboratory
Co-requisite for Signals and Systems.

326 Dynamic Systems & Introduction to Control Theory
Dynamic systems are systems that evolve with time. They occur all around us, throughout nature and the built environment. Understanding dynamic systems leads to the ability to control them, so they behave according to the engineer's design. This course introduces students to both linear dynamic system and modern control theories, so that students will be able to design and control simple dynamic systems. Through design projects, students gain practical experience in designing a simple controller for a dynamic system. Prerequisites: EGR 220; CSC 111; basic linear algebra from courses such as PHY 210 or MTH 211. **{N}** 4 credits
Judith Cardell
Offered Spring 2012

363 Mass and Heat Transfer
This upper-level course introduces the processes and accompanying mathematical representations that govern the transport of eat and mass, including advection, dispersion, adsorption, conduction, convection, and radiation. Applications include environmental transport and mixing, cooling and heat exchange, and separation processes. Prerequisites: EGR110 (formerly 260), EGR 290, and EGR 374 or permission of the instructor. 4 credits
Andrew Guswa

Offered Every Fall

374 Fluid Mechanics

This is the second course in a two-semester sequence designed to introduce students to fundamental theoretical principles and analysis of mechanics of continuous media, including solids and fluids. Concepts and topics to be covered in this course include intensive and extensive thermophysical properties of fluids, control-volume and differential expressions for conservation of mass, momentum, and energy, dimensional analysis, and an introduction to additional topics such as aerodynamics, open-channel flow, and the use of fluid mechanics in the design process. Required concurrent laboratory. Prerequisite: EGR 270. **{N}** 4 credits

Paul Voss

Offered every Spring

374L Fluid Mechanics Laboratory

Co-requisite for Fluid Mechanics

375 Strength of Materials

This course introduces students to the fundamentals of mechanics of materials from a static failure analysis framework. Structural behavior will be analyzed, along with the material and geometric contributions to this behavior. Lecture topics will be complemented with hands-on project work designed to help students make connections between the theoretical and experimental behavior of materials. Prerequisite: EGR 270. **{N}** 4 credits

Borjana Mikic

Offered every Spring

410D Engineering Design Clinic

This two-semester course leverages students' previous coursework to address an actual engineering design problem. Students collaborate in teams on real-world projects sponsored by industry and government. These projects are supplemented by course seminars to prepare students for engineering design and professional practice. Seminars include such topics as the engineering design process, project management, team dynamics, engineering economics, professional ethics and responsibility, regulations and standards, technical and professional communication, universal design, work/life balance, and sustainability. Regular team design meetings, weekly progress reports, interim and final reports, and multiple presentations are required. Prerequisite: EGR 100 and senior standing in Engineering or permission of the instructor. 8 credits

Susannah Howe

Offered Every Fall and Spring

ENGINEERING ELECTIVES

205 Science, Technology, and Ethics
This course draws on readings from philosophy, science and technology studies, feminist and postcolonial science studies, and engineering to examine topics including technology and control, science and social inequality, and the drive toward production and consumption on increasingly large, cheap, fast, automated, and global scales. What new models of science and engineering can change who decides how science and engineering are done, who can participate in the scientific enterprise, and what problems are legitimately addressed? Some course experience in one or more of the following is required: philosophy and ethics, the study of women and gender, or science and engineering. Enrollment limited to 15. **{N/S}** 4 credits
Donna Riley
Not Offered in 2011-2012

312 Atmospheric Processes
(Formerly Thermochemical Processes in the Atmosphere)
The atmosphere is among the most critically important parts of our environment. Atmospheric processes control our weather and climate, provide the nutrients for nearly all life on earth, and determine the quality of the air we breathe. This course explores key topics including atmospheric circulation, global warming, stratospheric ozone depletion, and urban air pollution. How does ground-level ozone form and why is it harmful to people and agriculture? What are high pressure systems and why are they associated with fair weather? How do clouds form and what impact do they have on our climate? What instruments are being used to measure the properties of the atmosphere and how do these instruments work? This course is recommended for anyone with a solid grounding in math and science and will be of interest to all students who want a better understanding of the environment. Prerequisites: CHM 111, EGR 110 (formerly 260), and EGR 374 (co-requisite) or permission of the instructor. 4 credits
Paul Voss
Offered Fall 2011

315 Ecohydrology
This course focuses on the measurement and modeling of hydrologic processes and their interplay with ecosystems. Material includes the statistical and mathematical representation of infiltration, evapotranspiration, plant uptake, and runoff over a range of scales (plot to watershed). The course will address characterization of the temporal and spatial variability of environmental parameters and representation of the processes. The course includes a laboratory component and introduces students to the Pioneer Valley, the cloud forests of Costa Rica, African savannas, and the Florida Everglades. Prerequisites: MTH 112 or 114 and MTH 245 or 241. 4 credits
Andrew Guswa
Offered Spring 2012

321 Digital Signal Processing
Digital signal processing (DSP) is the application of engineering tools and techniques to the analysis of signals so that relevant information can be extracted. DSP is important in a broad range of engineering arenas, including biomedical, chemical, electrical, environmental, and mechanical engineering. This course covers the fundamental concepts of digital signal processing, including, data acquisition, analog-to-digital and digital-to-analog conversion, digital filtering, discrete-time Fourier Transform, Discrete Fourier Transform, sampling, random signals, time averages, auto- and cross-correlation functions, windowing, and linear prediction. In this offering, we will focus on examples from biomedical research and clinical medicine where voltages generated by the brain or heart can be measured and processed in order to describe relevant function. Three month-long laboratory projects will provide a ``hands-on'' approach to learning the DSP concepts. Prerequisite:

Grade of C+ or higher in EGR 320 or permission of the instructor **{N/M}** 4 credits
Susan Voss
Not Offered 2011 - 2012

322 Acoustics
Acoustics describes sound transmission through solids and fluids; the focus of this course is sound transmission through air. This course provides an overview of the fundamentals of acoustics, including derivation of the acoustic wave equation, the study of sound wave propagation (plane and spherical waves), the study of sound transmission through pipes, waveguides, and resonators impedance analogies, an overview of the acoustics related to the human auditory system and an introduction to room acoustics. The course includes several short hands-on experiments to help understand the relevant concepts. Prerequisite: EGR 220. Enrollment limited to 12. **{N/M}** 4 credits
Susan Voss
Offered Spring 2012

325 Electric Power Systems
(Formerly Electric Energy Systems)
Wind and solar energy? Power generation from coal and nuclear fuel? What are our options for maintaining the high standard of living we expect, and also for electrifying developing regions? How can we make our energy use less damaging to our environment? This course introduces students to the field of electric power, from fuel sources, energy conversion technologies (renewable, hydro, nuclear and fossil), electricity transmission and ultimate end-use. Topics include analysis and simulation of power systems, discussions of emerging smart grid technologies, as well as policy, environmental and societal aspects of energy use. A short project allows students to select and explore individual technologies or a small power system in more depth. Prerequisite: EGR 220. **{N}** 4 credits
Judith Cardell
Not Offered in 2011-12

330 Engineering and Global Development
This course examines the engineering and policy issues around global development, with a focus on appropriate and intermediate technologies. Topics include water supply and treatment, sustainable food production, energy systems, and other technologies for meeting basic human needs. Students will design and build a prototype for an intermediate technology. This course is designed to be multidisciplinary, with students building on prior course work in each of their respective disciplines. Prerequisites for engineering majors are two of EGR220, 270, and 290. The prerequisite for non-engineering majors is one or more prior courses in globalization and/or development studies. All majors are welcome. **{N}** 4 credits
Donna Riley
Offered Fall 2011

333 Technological Risk Assessment and Communication
Risk abounds in our everyday life; technology can play a central role in both inducing and reducing risk. This course covers topics in risk analysis including risk assessment (modeling and estimating risks), risk abatement (strategies and technologies for reducing risk), and risk management (public or private processes for deciding what risk levels are acceptable). We will examine the psychology of risk perception, judgment and decision making, and human factors issues in engineering design that increases or reduces risk. Students will develop an understanding of the complex relationships between risk and benefit, and learn to design and evaluate risk communication materials. Prerequisites: MTH 241, 245 or some other introduction to probability or permission of the instructor. The course relies upon some knowledge of basic probability. **{S/N}** 4 credits
Donna Riley

Not offered 2011 - 2012

340 Geotechnical Engineering
What is quicksand and can you really drown in it? Why is Venice sinking? In this class students will be introduced to the engineering behavior of soil within the context of a variety of real world applications that include constructing dams, roads and buildings; protecting structures from earthquake and settlement damage; and preventing groundwater contamination. Topics to be covered include soil classification, permeability and seepage, volume changes, effective stress, strength, and compaction. We will use a variety of approaches to learning including discussion, hands-on activities, labs, projects, field trips and in-depth explorations of topics chosen by the students. Prerequisite: EGR 270 or GEO 241 or permission of instructor. **{N}** 4 credits
Glenn Ellis
Not offered 2011 – 2012

346 Hydrosystems Engineering
Through systems analysis and design projects, this course introduces students to the field of water resources engineering. Topics include data collection and analysis, decision-making under uncertainty, the hydrologic cycle, hydropower, irrigation, flood control, water supply, engineering economics, and water law. Prerequisites: MTH 112 or 114, EGR 374 (or permission of the instructor). 4 credits
Andrew Guswa
Not offered 2011 - 2012

372 Advanced Solid Mechanics and Failure Analysis
Building on the fundamentals of solid mechanics and materials science introduced in EGR 375, this course provides students with an advanced development of techniques in failure analysis, including static failure theories, fatigue life prediction, and linear elastic fracture mechanics. These techniques are used in many aspects of mechanical design and the evaluation of structural integrity. Prerequisites: EGR 375 or equivalent. **{N}** 4 credits
Borjana Mikic
Not Offered in 2011-2012

373 Skeletal Biomechanics
Knowledge of the mechanical and material behavior of the skeletal system is important for understanding how the human body functions, and how the biomechanical integrity of the tissues comprising the skeletal system are established during development, maintained during adulthood, and restored following injury. This course will provide a rigorous approach to examining the mechanical behavior of the skeletal tissues, including bone, tendon, ligament, and cartilage. Engineering, basic science, and clinical perspectives will be integrated to study applications in the field of Orthopaedic Biomechanics. Enrollment limited to 16. Prerequisites include EGR 375 and BIO 150 or BIO 152 or permission of the instructor. **{N}** 4 credits
Borjana Mikic
Offered Fall 2011

377 Aerial Vehicle Design
Remotely piloted and autonomous aircraft are increasingly being used in scientific research, agriculture, disaster mitigation, and national defense. These small and efficient aircraft offer major environmental benefits while, at the same time, raising complex ethical and policy issues. This course introduces the rapidly growing field of aerial vehicle design and low-Reynolds number aerodynamics through a major project in which students will design, fabricate, and test a remotely piloted aircraft. Prerequisites: EGR 374, CSC 111, and either EGR 220 or CSC 270, or permission of the instructor. Enrollment limited to 18 students. 4 credits
Paul Voss

Not offered 2011 – 2012

380 Neuroengineering
This course explores how electric potentials are generated across the membranes of cells and how cells use these potentials to send messages. Specific topics include: lumped- and distributed-parameter models of cells, core conductor and cable models, action potentials, voltage clamp currents, the Hodgkin-Huxley model, myelinated nerve fibers and saltatory conduction, ion channels, and gating currents. Along with the study of these cellular processes, the class covers specific engineering applications that take advantage of electrically-excitable cells within the human body, such as the cochlear implant, the pacemaker, and electrically-evoked potentials (e.g., EKG). Prerequisite: EGR 220 or permission of the instructor **{N/M}** 4 credits
Susan Voss
Not Offered 2011 – 2012

388 Photovoltaic and Fuel Cell System Design
This course applies fundamental principles of thermodynamics, electrochemistry and semi-conductor physics to the design, modeling, and analysis of renewable energy power systems. Concepts to be covered in this course include extraterrestrial radiation, solar geometry, atmospheric effects, polarization curve characteristics, system components and configurations, stand-alone and hybrid system design, and load interactions. This course applies these theoretical concepts in a laboratory setting involving the design and testing of fuel cell and photovoltaic systems. Prerequisites: EGR 220, CHM 111, EGR 290 (may be concurrent). 4 credits
Denise McKahn
Not Offered in 2011-2012

389 Techniques for Modeling Engineering Processes
The goal of this course is to introduce students to several approaches used to model, understand, simulate and forecast engineering processes. One approach to be covered is the use of artificial neural networks – a branch of artificial intelligence (AI) with connections to the brain. Other approaches to be covered are based upon probability and statistics and will include auto-regressive moving average (ARIMA) processes. Although students will learn about the theory behind these approaches, the emphasis of the course will be on their application to model processes throughout the field of engineering. Some examples include earthquake ground motion, financial markets, water treatment, and electrical systems. Acknowledging the interdisciplinary nature of AI, students will also investigate the possibilities of machine consciousness. Prerequisite or co-requisite: MTH 241 or 245. **{N}** 4 credits
Glenn Ellis
Not Offered in 2011-2012

390: Advanced Topics in Engineering
Topic: Communications and Wireless Sensor Networks
Our world is being transformed by networked communications, in terms of both engineering advances and social, political and economic interactions. Underlying this transformation are three major technologies: computer networks, wireless communications and sensors. This course will introduce students to the theory and implementation of these technologies, including an overview of the OSI protocol stack, more focused study of the 802.11 and Zigbee wireless protocols, and the use of basic sensors as controlled by microprocessors. Students will also analyze and debate privacy and security concerns, as well as the social, political and economic benefits of these technologies. Students will participate in designing and implementing a small wireless sensor network on Smith Campus, using this test bed as the means to gain a deeper understanding of the technologies and the issues they raise. Prerequisites: CSC 111, EGR 220, or permission of instructor. 4 credits.
Judith Cardell
Offered Spring 2012

400 Special Studies
Available to sophomore students with permission of their major adviser and engineering department.
Variable credit 1-4 as assigned

Honors
Director: Susannah Howe

430d Honors Project
8 credits
Full year course; Offered each year

432d Honors Project
12 credits
Full year course; Offered each year

Please consult the Director of Honors for specific requirements and application procedures.

Appendix B – Examples of Thematic Elective Course Groupings

Students are required to demonstrate reasonable technical depth by developing a sequence of three thematically related engineering electives (two of which must be at the 300 level or higher) selected in consultation with the student's adviser and with a short proposal outlining the rationale. All of the electives listed below may be used to develop an engineering concentration. These groupings are meant to serve only as examples.

Mechanical Systems	Energy & Environment
EGR 315 Ecohydrology	EGR 312 Atmospheric Processes
EGR 322 Acoustics	EGR 315 Ecohydrology
EGR 326 Dynamic Systems	EGR 325 Electric Power Systems
EGR 340 Geotechnical Engineering	EGR 388 PV & FC System Design
EGR 346 Hydrosystems Engineering	
EGR 372 Adv. Solid Mechanics & Failure Analysis	
EGR 373 Skeletal Biomechanics	
EGR374 Fluid Mechanics	
EGR375 Strength of Materials	
EGR 377 Aerial Vehicle Design	
Electrical Systems	**Ethics, Risk & Policy**
EGR 320 Signals and Systems	EGR 205 Science, Tech., & Ethics
EGR 321 Digital Signal Processing	EGR 325 Electric Power Systems
EGR 322 Acoustics	EGR 326 Dynamic Systems
EGR 325 Electric Power Systems	EGR 330 Engineering & Global Dev
EGR 326 Dynamic Systems	EGR 333 Tech. Risk Ass. & Comm.
EGR 377 Aerial Vehicle Design	
EGR 380 Neuroengineering	
EGR 388 Photovoltaic & Fuel Cell System Design	
EGR 390: Communications & Wireless Sensors	
Thermochemical Processes	**Design**
EGR 312 Atmospheric Processes	EGR 326 Dynamic Systems
EGR 315 Ecohydrology	EGR 330 EGR & Global Devel.
EGR 326 Dynamic Systems	EGR 377 Aerial Vehicle Design
EGR 363 Mass and Heat Transfer	EGR 388 PV & FC System Design
EGR 388 Photovoltaic & Fuel Cell System Design	
General Electives*	**Biomedical**
EGR 205 Science, Technology, & Ethics	EGR 321 Digital Signal Processing
EGR 330 Engineering and Global Development	EGR 322 Acoustics
EGR 333 Technological Risk Assess. & Comm.	EGR 373 Skeletal Biomechanics
EGR 390 Adv. Topics in Engineering (topics vary)	EGR 380 Neuroengineering
EGR 400 Special Studies (by petition)	

*General Electives: the electives listed here support a wide range of engineering concentrations

Appendix C - Examples of Programs of Study

Mechanics Focus

YEAR	FALL	SPRING
1	EGR 100 CHM 111 MTH 111 (MTH 114 if have AP credit) Writing Intensive Course	EGR 110 PHY 117 MTH 112 (Elective if took MTH 114) CSC 111
2	EGR 270 PHY 118 or other approved science PHY 210 Latin Honors - Foreign Language	EGR 374 EGR 375 MTH 211 Latin Honors - Foreign Language
3	EGR 220 EGR 290 MTH 241 or 245 EGR 363	EGR Elective EGR Elective General Elective Latin Honors - History
4	EGR 410 EGR Elective Latin Honors - Social Science General Elective	EGR 410 Latin Honors - Literature Latin Honors – Art General Elective

Electrical Focus

YEAR	FALL	SPRING
1	EGR 100 CHM 111 MTH 111 (MTH 114 if have AP credit) Writing Intensive Course	EGR 110 PHY 117 MTH 112 (elective if took MTH 114) CSC 111
2	EGR 270 EGR 220 PHY 210 Latin Honors Elective – History	PHY 118 or other approved science EGR 320 or 326 MTH 211 Latin Honors - Literature
3	EGR 290 EGR Elective Latin Honors - Foreign Language MTH 241 or 245	EGR 374 EGR 326 or 320 General Elective Latin Honors - Foreign Language
4	EGR 410 EGR Elective Latin Honors - Social Science General Elective	EGR 410 EGR Elective Latin Honors – Art General Elective

Thermochemical Focus

YEAR	FALL	SPRING
1	EGR 100 CHM 111 MTH 111 (MTH 114 if have AP credit) Writing Intensive Course	EGR110 PHY 117 MTH 112 (elective if took MTH 114) CSC 111
2	EGR 270 EGR 290 PHY 210 Latin Honors Elective – History	EGR 374 PHY 118 or other approved science MTH 211 Latin Honors - Literature
3	EGR 220 EGR 363 MTH 241 or 245 Latin Honors - Foreign Language	EGR 320 or EGR 326 EGR Elective General Elective Latin Honors - Foreign Language
4	EGR 410 EGR Elective Latin Honors - Social Science General Elective	EGR 410 EGR Elective Latin Honors – Art General Elective

To demonstrate technical depth, students must identify three thematically related engineering electives that form the basis of a concentration. Electives may be used to develop any engineering concentration. The three examples above demonstrate a program of study around traditional concentrations. In discussions with your advisor you can adapt and create a program of study with a focus or concentration that meets your interests.

Study Abroad (Foreign Language)*

YEAR	FALL	SPRING
1	EGR 100 CHM 111 Writing Intensive Course Latin Honors – Foreign Language I	EGR 110 PHY 117 MTH 114 Latin Honors – Foreign Language II
2	EGR 220 PHY 210 EGR 270 General Elective – Foreign Language III	EGR 374 PHY 118 or other approved science MTH 211 General Elective – Foreign Language IV
3 ABROAD	*Thermodynamics* *equivalent EGR 290* *Computer Science I* *equivalent CSC 111* *Probability & Statistics* equivalent MTH241 or 245 *Latin Honors – History*	*Strength of Materials* equivalent EGR375 *Mass & Heat Transfer* equivalent EGR363 *Latin Honors – Social Science* *Latin Honors - Literature*
4	EGR 410 EGR Elective Latin Honors - Art General Elective	EGR 410 EGR Elective EGR Elective General Elective

* If no AP credit for AB Calculus, a student could take MTH111&112 in the first year and the equivalent of the first year of a foreign language in the summer between first & second years

Appendix D.1 - Engineering Program Honors Guidelines

NOTE: These guidelines should be consulted in conjunction with the "Departmental Honors Program" guidelines written by the College's Subcommittee on Honors and Independent Programs (available from the Senior Class Dean's Office, College Hall Room 23).

Obtaining an Application: By the end of the first week of the fall semester of senior year, obtain an information packet from the departmental Director of Honors. This packet includes the guidelines for the "Departmental Honors Program" and a pink "Request for a Certification on Completion of Requirement" form, a white "Financial Assistance for Departmental Honors" form, and a yellow 'Required Library Instruction" form. *We strongly recommend that students obtain an application packet before the end of second semester, Junior year.*

Completing the Application: Complete the pink form and submit it directly to the Senior Class Dean's Office. The candidate will then receive a blue "Application to Enter Departmental Honors" form from the Senior Class Dean's Office. This application must be completed, signed by the faculty adviser, and submitted to the departmental Director of Honors by 5 pm on Sept. 12, 2011 of the fall semester so plan accordingly.

Requests for Financial Assistance: The Tomlinson Memorial fund provides financial assistance for Honors thesis projects. A candidate interested in obtaining funds must complete the application form "Financial Assistance for Departmental Honors" and submit it with her Honors application. This application form can be obtained from the departmental Director of Honors or the Senior Class Deans Office.

Submitting the Application: The completed application must be submitted to the departmental Director of Honors by 5 pm on Sept. 12, 2011 of the fall semester, senior year. The engineering faculty will vote to approve the Honors applications at the first program meeting of the semester and the application, if approved, will be forwarded to the College's Subcommittee on Honors and Independent Programs for final approval.

Library instruction: The Honors candidate must make a bibliographic assistance appointment with a librarian in the Young Science Library. The candidate must complete this appointment, have the yellow 'Required Library Instruction" form signed, and forward this form to the Subcommittee on Honors and Independent Programs by October 7, 2011.

Choosing a Second Reader: The faculty adviser and the Honors candidate should confer together and choose an appropriate second reader. The second reader does not have to be in the department. By the end of the first week of the spring semester of her Honors thesis, the Honors candidate is responsible for approaching the second reader and asking if the faculty member will serve in this capacity. A second reader can be selected earlier in the process and this may be advantageous to allow more input from the second reader throughout the process. It is the responsibility of the Honors candidate to confer with the second reader as to the extent of her or his involvement (e.g. review rough drafts or only the final draft, review with the student the goals of the project during the process, troubleshooting, other difficulties, etc). The Honors candidate is responsible for informing the departmental Director of Honors of the name of the second reader by the end of the first week of the spring semester.

Submission of Rough Draft: A rough draft of the candidate's thesis must be submitted to the faculty adviser (first reader) and the second reader by March 23, 2012. *It is expected that the*

student will submit each chapter to her faculty adviser for feedback prior to this date. March 23, 2012 is the last date that a complete rough draft can be submitted to the readers.

Submission of Final Thesis: The final version of the candidate's thesis (to be graded) must be submitted to the faculty adviser (first reader) and the second reader by April 6, 2012. Candidates who do not submit final versions to both the first and second readers by April 6, 2012 risk losing eligibility for Honors.

The written thesis will be evaluated with emphasis towards both content (e.g. hypotheses, critical thinking, appropriate use of controls, statistical analysis, interpretation of data, conclusions drawn from the work) as well as effective communication (e.g. figures, formatting, illustrations, etc). The written thesis will be designated by Highest Honors, High Honors, Honors, Pass, or Fail.

Oral Presentation of the Honors Thesis: The Honors candidate will give a 20 minute oral presentation of her Honors research for the department which will be open to all interested members of the Smith College community. This presentation will be scheduled either the last week of classes, but no later than the last day of the pre-examination study period.

The oral presentation will be evaluated with an emphasis towards content, organization, response to questions, as well as effective communication. The oral presentation will be designated by Highest Honors, High Honors, Honors, Pass, or Fail.

The final level of departmental honors will be granted by Highest Honors, High Honors, Honors, Pass, or Fail. based on the recommendation of the Departmental Honors Committee and in accordance with the Smith College guidelines on evaluation of the honors thesis and the honors examination. The overall Honors evaluation is based upon the following three criteria at the given percentages:

20% grades
60% written thesis
20% oral presentation

Library copy of thesis: This final copy of the thesis, on archival quality paper, should be submitted directly to the Class Dean's Office by the Monday after the final examination period. The departmental copy of the thesis, also printed on archival quality paper, should be submitted directly to your adviser. *Formatting of the document should comply with the Honors Thesis Guidelines provided by the Smith College Libraries, available on the internet.*

Appendix D.2 – College Guidelines for the Departmental Honors Program

http://www.smith.edu/classdeans/honors_program.php

The Departmental Honors Program allows a student with a strong academic background to complete an honors project in the department or program of the major. Successful completion of work in the honors program (an honors project undertaken under the direction of a faculty member in the major department or program and at least one honors examination) leads to the awarding of the bachelor of arts degree with the added notation "Honors," "High Honors," or "Highest Honors" in the student's major subject. Honors projects may only be undertaken by eligible seniors who are in residence in Northampton for the duration of the project.

Prospective applicants to the Departmental Honors Program should consult the director of honors in their major department or program *before* the registration period in the second semester of the junior year about specific application criteria and deadlines. Guidelines, requirements and options for the Departmental Honors Program will be outlined on the webpage of each department or program as well as in the catalogue following the respective course offerings.

College deadlines are established by the Subcommittee on Honors and Independent Programs (SHIP) of the Committee on Academic Priorities (CAP), which administers the Departmental Honors Program. Questions should be directed to the Dean of the Senior Class as Chair of the Subcommittee on Honors and Independent Programs, College Hall 101, extension 4930 or to honors@smith.edu.

Eligibility

Eligibility for admission to the Departmental Honors Program is determined by each department or program. A student applying to the Departmental Honors Program must have approval of the major department or program before the application can be forwarded to the Subcommittee on Honors and Independent Programs.

Options and Credits for Honors Project Courses

Each department or program determines which honors project course option or options will be available for credit:

a) **One-semester course (431** for **8 credits) –**fall semester *only* of the senior year;
b) **Year-long course (430D** for **8 credits – 4 credits in each** semesters of the senior year
c) **Year-long course (432D** for **12 credits) – 6 credits in each** semesters of the senior year

Timing and Deadlines

A student may apply to enter the Departmental Honors Program no earlier than the end of the second semester of the junior year and no later than the beginning of the first semester of the senior year.

SPECIFIC DATES FOR EACH YEAR ARE LISTED SEPARATELY ON THE HONORS WEBSITE.

Spring applications from departments and programs for **second-semester juniors** must reach the Chair of the Subcommittee on Honors and Independent Programs, with approval of the student's major department or program, by **the Monday after the last day of the semester**. Decisions about admission to the departmental honors program is made after grades from spring semester 2011 are recorded.

Fall applications from **first-semester seniors** must reach the Chair of the Subcommittee on Honors and Independent Programs, with approval of the student's major department or program, by **the second Friday of the fall semester.**

It is the student's responsibility to submit the completed application to the Director of Honors prior to the last meeting of the department or program in the spring semester or the first meeting in the fall semester.

Incomplete applications are not considered.

Requests for funding (see below under Tomlinson Fund) should accompany the honors application.

Course/Credit Load

Candidates for departmental honors must carry a minimum course load (12 credits) in each semester of the senior year (Ada Comstock Scholars should see the Class Dean for Ada Comstock Scholars regarding credit load). Any variation in the credit distribution described above must be approved by the Subcommittee on Honors and Independent Programs.

Application

A prospective applicant should consult prior to the advising period in the second semester of the junior year with a faculty member in the department or program of her major who is willing to serve as her adviser and direct her proposed project. The primary project adviser *must* be a member of the Smith faculty in the department or program of the student's major; faculty at other Five College institutions may serve only as second readers.

The application process consists of five steps on the student's part:

1. Request *via email* to honors@smith.edu a "Calculation of GPA Requirements Form". Please include your ID number; if you have two majors indicate which major is for honors. The form will be sent via email.
2. Calculate, together with the project adviser, your grade point average(s) inside the major (and outside the major if required by your major department or program). The GPA(s) must be equal to or higher than required by your major department or program.
3. Submit to the Director of Honors in the major department or program (and subsequently to the Subcommittee on Honors and Independent Programs) a **project proposal** consisting of 500-1,000 words (2-4 pages) containing:
   - a description of the broader scholarly issue to be investigated or undertaken;
   - the specific question or hypothesis to be treated;
   - an explanation of the approach to be taken and evidence of experience using this approach;
   - documentation of relevant background, preparation, special facility or skills necessary to undertake the proposed project (e.g., previous course work related to the project topic, quantitative skills, foreign language ability, etc.);
   - a bibliography.
4. Obtain the signature of your project adviser.
5. Submit the completed application plus any request for funding from the Nancy Kershaw Tomlinson Memorial Fund to the Director of Honors in the major department or program prior to the first meeting of the department or program for the fall semester.

After the department or program has considered the application, the Director of Honors should forward the application, together with the recommendation, to the Chair of the Subcommittee on Honors and Independent Programs, College Hall 101 no later than **the Monday after the end of the semester** for second semester junior applicants or **the second Friday of the semester** for first-semester senior applicants.

Nancy Kershaw Tomlinson Memorial Fund

The Tomlinson Fund assists in providing essential expenses of students in carrying out their honors projects. Guidelines are available at

http://www.smith.edu/classdeans/honors_program.php

Required Project Research Appointment

Each student accepted into the Departmental Honors Program must arrange for a research appointment with a reference librarian or archivist at the Hillyer Art Library, Josten Performing Arts Library, William Allan Neilson Library, or Young Science Library. The purpose of this session is to prepare the student for locating, obtaining, evaluating, and correctly documenting all relevant sources needed for a successful project. These skills are necessary even if some research has already been conducted. The content of each meeting is tailored to the student's topic and presents an opportunity for the student to ask specific questions about the proposed research process as well as a chance to develop expertise in using the most relevant databases, web sites, or other vital research tools.

This hour-long meeting must take place by **the fifth Friday of the semester** (the drop deadline) at the latest, but it should be made as early as possible so that the student can take full advantage of the print and electronic resources to be demonstrated. Since the librarian or archivist will need some time to research each project topic, expect that the scheduling process will take a few days. To schedule a research appointment, follow the instructions at: http://www.smith.edu/classdeans/honors_program.php

THE FINAL DECISION REGARDING ADMISSION TO THE DEPARTMENTAL HONORS PROGRAM RESTS WITH THE SUBCOMMITTEE ON HONORS AND INDEPENDENT PROGRAMS.

Appendix E – Princeton-Smith Exchange Guidelines

Engineering Exchange Program

An exchange program between Princeton University and Smith College permits students from Smith's Picker Engineering Program to study at Princeton and engineering students from Princeton to study at Smith. Both programs share the goal of producing leaders for the 21st century and the belief that successful engineers can identify the needs of society and direct their talents toward meeting them. The exchange will afford students on both campuses the opportunity to have a rich experience in a social and academic environment that differs considerably from that of their home institution. At Smith, Princeton students will have an opportunity to live and study in a community where small classes afford extensive opportunities for close contact and collaboration with faculty and peers in a curriculum that stresses integration with the Liberal Arts, and where 100% of the engineering students and over 60%of the faculty are women. The Picker Engineering Program has special strengths in biomedical engineering, energy & the environment, and engineering policy. At Princeton, Smith students will be exposed to an engineering community that includes about 750 undergraduates (of about 4600 total) 500 graduate students and 130 faculty members across six engineering departments: Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Mechanical and Aerospace Engineering, and Operations Research and Financial Engineering. The course offerings, research facilities and independent research opportunities are extensive.

Program of Study

Students will typically exchange in the Spring semester of their junior year. The typical load is four courses at both institutions, though a course load of up to 5 can be accommodated. Students can choose from any of the courses offered at both institutions. Typically, at both institutions a program of study would comprise two or three technical courses, junior independent work or a junior project course, and no more than one course in the humanities. Students are encouraged to carry out an independent research project during the term. Programs of study will be approved by advisers at Princeton and Smith.

Independent Research Project

A visiting Smith student will be a member of the department that matches best with her primary interests. Those Smith students who choose to do an independent research project and who earn a semester average of a B+ or better will be invited to continue their independent research project into the summer between their junior and senior years so as to complete a substantial piece of research. The summer component of the visiting student's research program would be supported by a stipend from the faculty member with whom the research is conducted. All visiting Princeton students will be a part of the Picker Engineering Program and should feel free to contact a faculty member directly if they are interested in pursuing an independent research project.

Admission

Prior to applying for admission to the program, a student should discuss the course and research opportunities with her academic advisor or department representative of the Picker Engineering Program at Smith, or the Associate Dean for Undergraduate Affairs of the School of Engineering and Applied Science at Princeton. The student may be directed to the appropriate faculty members at Princeton or Smith to further explore research opportunities. A visit to the other campus in the fall term of the junior year will help facilitate exploring potential independent research projects and courses to be taken. Applications must be submitted **to the principal contact at the home institution in October** (see Prof. Andrew Guswa for exact dates)**,** and

the candidates will be notified in November. If accepted, the Smith student must submit a leave of absence form to the junior class dean by December 1.

Tuition, Fees, Housing, Dining
Smith College students accepted for the Smith-Princeton Exchange Program are charged their normal home college tuition and fees. These costs are paid to Smith College. The room and board charges will be paid directly to Princeton University. Students provide their own transportation to and from Princeton. Students on financial aid normally receive their regular assistance while on the Exchange Program. Housing would be in Princeton University dormitories for juniors and seniors. Several dining options exist, including purchase of a Princeton University dining contract, independent self-catering, and possibly membership in an eating club.

Princeton Life
Members of Princeton undergraduate engineering societies, including the Society of Women Engineers, the Tau Beta Pi engineering honor society, the Engineering Council, and departmental organizations, will play an active role in welcoming visiting Smith students and involving them in the engineering community and undergraduate life at Princeton. With the exception of varsity intercollegiate athletics, which are bound by strict NCAA rules, visiting Smith students are welcome to explore participation in all types of extracurricular activities that interest them.

Smith Life
Members of the Society of Women Engineers, the Tau Beta Kappa engineering honor society, will play an active role in welcoming Princeton students and involving them in the engineering community and undergraduate life at Smith. Additionally, residential life at Smith is considered an important part of a traditional-aged student's education. Smith is committed to a co-curricular environment that enhances and enriches the academic program: residential living is an integral part of that education.

For More Information

Principal Smith contact:	Andrew Guswa, Associate Professor
	aguswa@smith.edu phone: 413-585-7019
Smith engineering website:	http://www.smith.edu/engin
Smith course catalog**:**	http://www.smith.edu/acad_catalogs.php
Smith calendar:	http://www.smith.edu/registrar/dates.php
Principal Princeton contact:	Peter Bogucki, associate dean for undergraduate affairs
	bogucki@princeton.edu, phone: 609-258-4554
Princeton engineering URL:	http://engineering.princeton.edu
Princeton course catalog:	http://registrar1.princeton.edu/course/course.cfm
Princeton registrar/calendar:	http://www.princeton.edu/pr/catalog/ua/05/index.htm