The Charles V. Schaefer, Jr. School of Engineering

Undergraduate Programs

BACHELOR OF ENGINEERING

The Stevens engineering curriculum is rooted in a tradition that has set it apart since the founding of the Institute in 1870, yet it remains responsive to the changing demands of the workplace into which one graduates. The Stevens tradition recognizes the value of a broad core curriculum that provides significant breadth in engineering, the sciences and the humanities, combined with the necessary depth in your chosen engineering discipline.

To meet these goals, the Charles V. Schaefer, Jr. School of Engineering offers a demanding curriculum. It prepares you technically and instills a work ethic that has proven of considerable value to our graduates throughout their lives. In addition to strong technical competencies in general engineering and the specific discipline, the curriculum teaches key competencies that are highly valued by employers. These include strong problem-solving skills, effective team-participation skills and the ability to communicate effectively, in both written and oral modes.

A major vehicle for achieving these competencies in the engineering curriculum is the Design Spine. The Design Spine is a sequence of design courses each semester; initially it is integrated with science and engineering core courses and, in future semesters, the discipline-specific program. Design is at the heart of engineering. Design activities allow you to gain confidence in applying and reinforcing the knowledge learned in the classroom.

As an engineering student, you take core courses for the first three semesters. The choice of the engineering discipline in which you will concentrate is made late in the third semester. You are provided many opportunities to explore the various engineering fields.

You may choose to specialize in biomedical, chemical, civil, computer, electrical, environmental or mechanical engineering, as well as engineering management. A program in engineering is also available which presently has concentrations in information systems engineering, naval engineering and biomedical engineering.

A strength of the Stevens engineering curriculum is the requirement for a significant thread of humanities and general education courses throughout the four-year program. You may take advantage of this as a platform to pursue a minor or to pursue the double degree program, a B.A. degree in addition to the B.E. degree.

The following pages outline the structure of the engineering curriculum by semester, showing core course and technical elective requirements. Specific

concentrations are described by the department, as are requirements for their minor programs.

Mission and Objectives

The Charles V. Schaefer, Jr. School of Engineering is dedicated to educating students to have the breadth and depth required to lead in their chosen profession in an environment replete with the excitement of new knowledge and technology creation.

The graduates of the Charles V. Schaefer, Jr. School of Engineering shall:

Demonstrate technical competence in engineering design and analysis consistent with the practice of a specialist and with the broad perspective of the generalist.

- Develop the hallmarks of professional conduct, including a keen cognizance of ethical choices, together with the confidence and skills to lead, to follow and to transmit ideas effectively.
- Inculcate learning as a lifelong activity and as a means to the creative discovery, development and implementation of technology.

Our graduate programs prepare students to:

- Expand the scope of their professional activities in academia, industry and government and increase the diversity of their careers; and
- Create and transfer knowledge through cutting-edge research and succeed in bringing innovations to the marketplace.

Course Sequence

The general template of the engineering curriculum for all programs is as follows:

Freshman Year					
Term I					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ch 115	General Chemistry I	3	0	6	3
Ch 117	General Chemistry Lab I	0	3	0	1
Ma 115	Math Analysis I	3	0	6	3
E 101	Eng. Experiences I #	1	0	0	0
E 121	Engineering Design I	0	3	2	2
E 120	Engineering Graphics	0	2	2	1
E 115	Intro. To Programming	1	1.5	3	2
Hu	Humanities	3	0	6	3

	# credit applied in E102				
TOTAL		**11**	**9.5**	**25**	**15**

Term II					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Science	Science Elective I (1)	3	0	6	3
E 102	Eng. Experiences II #	1	0	0	1
Ma 116	Math Analysis II	3	0	6	3
PEP 111	Physics I	3	0	6	3
E 122	Engineering Design II	0	3	3	2
Hu	Humanities	3	0	6	3
	# credit for E101 & 102				
TOTAL		**13**	**3**	**27**	**15**

Sophomore Year

Term III					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 221	Differential Equations	4	0	8	4
PEP 112	Physics II	3	0	6	3
E 126	Mechanics of Solids	4	0	8	4
E 245	Circuits & Systems	2	3	7	3
E 231	Engineering Design III	0	3	2	2
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**37**	**19**

Term IV					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 227	Multivariate Calculus	3	0	6	3
	OR approved alternative**				

E 232	Engineering Design IV	2	3	7	3
E 234	Thermodynamics**	3	0	6	3
Science	Science Elective II (1)	2	3	7	3
T.E.	Technical Elective ‡	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**38**	**18**

Junior Year

Term V

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
E 342	Transport/Fluid Mech. **	3	3	6	4
E 344	Materials Processing	3	0	6	3
E 321	Engineering Design V	0	3	2	2
E 243	Prob & Statistics	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**15**	**6**	**32**	**18**

Term VI

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
E 345	Modeling & Simulation ‡	3	0	6	3
E 355	Engineering Economics	3	3	6	4
E 322	Engineering Design VI ‡	1	3	5	2
T.E.	Technical Elective ‡	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
TOTAL		**16**	**6**	**35**	**18**

Senior Year					
Term VII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
T.E.	Technical Elective ‡	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
E 423	Engineering Design VII‡	0	8	4	3
T.G.	Technogenesis core**	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
Total		**15**	**8**	**34**	**18**
Term VIII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
T.E.	Technical Elective ‡	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
E 424	Engineering Design VIII ‡	0	8	4	3
Hu	Humanities	3	0	6	3
TOTAL		**12**	**8**	**28**	**15**

** Core option – specific course determined by engineering program
‡ Discipline specific course
(1) Basic Science electives – note: engineering programs may have specific requirements
- one elective must have a laboratory component
- two electives from the same science field cannot be selected
(2) General Education Electives – chosen by the student
- can be used towards a minor or option
- can be applied to research or approved international studies

GRADUATION REQUIREMENTS

The following are requirements for graduation of all engineering students and are not included for academic credit. They will appear on the student record as pass/fail.

Physical Education

All engineering students must complete a minimum of three semester credits of Physical Education (P.E.). A large number of activities are offered in lifetime, team and wellness areas. Students must complete at least one course in their first semester at Stevens; the other two can be completed at any time, although it is

recommended that this be done within the first half of the student's program of study. Students can enroll in more than the minimum required P.E. for graduation and are encouraged to do so.

Participation in varsity sports can be used to satisfy the full P.E. requirement.

Participation in supervised, competitive club sports can be used to satisfy up to half of the P.E. requirement with approval from the P.E. Coordinator.

English Language Proficiency

All students must satisfy an English Language proficiency requirement.

PLEASE NOTE: *A comprehensive Communications Program will be implemented for the Class of 2009. This may influence how the English Language Profiency requirement is met. Details will be added when available.*

ENGINEERING PROGRAM

In addition to offering accredited B.E. degree programs in specific engineering disciplines, Stevens also offers an accredited B.E. degree program in Engineering. The B.E. in Engineering is founded on the strength of the extensive Stevens core curriculum in exposing students to a breadth of engineering topics while allowing for concentration in an engineering area. In this regard it allows for a somewhat more flexible program than is typically available in a specialized B.E. program. At present, concentrations are offered in Information Systems Engineering, Naval Engineering and in Biomedical Engineering under the Engineering program*. Several technical electives within the program can be tailored to a student's interests under the guidance of the program faculty advisor.

*Note: This program differs from the recently instituted specialized B.E. Program in biomedical engineering. The latter is not yet eligible for accreditation.

Engineering with a concentration in Information Systems Engineering

The Departments of Systems Engineering and Engineering Management (SEEM) and Electrical and Computer Engineering (ECE) jointly offer an Information Systems Engineering (ISE) concentration under the Engineering Program in the undergraduate curriculum.

The goal of the ISE concentration is to produce graduates with a broad engineering foundation who can be effective in the analysis, design, construction, implementation and management of information systems.

The program consists of a core of 6 classes taken by all students in the concentration. A student can choose either a focus area in information systems management or networked information systems. The following lists typical electives within each focus. Other appropriate electives can be chosen with the approval of a faculty advisor.

<u>Network Information Systems (NIS)</u>
CpE 491 Information Systems II

CpE xxx Wireless Network Systems
CpE xxx TBA

Information Systems Management (ISM)
EM 301 Engineering Cost Management
EM 466 Total Quality Control
SYS 5xx Business Process Engineering

Engineering – Concentration in Information Systems Engineering

Freshman Year					
Term I					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ch 115	General Chemistry I	3	0	6	3
Ch 117	General Chemistry Lab I	0	3	0	1
Ma 115	Calculus I	3	0	6	3
E 101	Eng. Experiences I #	1	0	0	0
E 121	Engineering Design I	0	3	2	2
E 120	Engineering Graphics	0	2	2	1
E 115	Intro. To Programming	1	1.5	3	2
Hu	Humanities	3	0	6	3
	# credit applied in E102				
TOTAL		**11**	**9.5**	**25**	**15**

Term II					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Science	Science Elective I (1)	3	0	6	3
E 102	Eng. Experiences II #	1	0	0	1
Ma 116	Calculus II	3	0	6	3
PEP 111	Physics I	3	0	6	3
E 122	Engineering Design II	0	3	3	2
Hu	Humanities	3	0	6	3

	# credit for E101 & 102				
TOTAL		**13**	**3**	**27**	**15**

Sophomore Year					
Term III					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 221	Differential Equations	4	0	8	4
PEP 112	Physics II	3	0	6	3
E 126	Mechanics of Solids	4	0	8	4
E 245	Circuits & Systems	2	3	7	3
E 231	Engineering Design III	0	3	2	2
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**37**	**19**

Term IV					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 134	Discrete Math**	3	0	6	3
	OR approved alternative**				
E 232	Engineering Design IV	2	3	7	3
E 234	Thermodynamics**	3	0	6	3
Science	Science Elective II (1)	2	3	7	3
EM 475	Project Mgmt. ‡	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**38**	**18**

Junior Year					
Term V					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
EE471 or E 342	Trans. Phen. Trans./Fluid Mech.	4 3	0 3	6 6	4 4
E 344	Materials Processing	3	0	6	3
E 321	Engineering Design V	0	3	2	2
E 243	Prob & Statistics	3	0	6	3
CpE 360	Comp and Data Structures & Alg ‡	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		15	6	32	18

Term VI					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
CpE/Sys 345	Modeling & Simulation ‡	3	0	6	3
E 355	Engineering Economics	3	3	6	4
E 322	Engineering Design VI ‡	1	3	5	2
CpE 490	Info Systems Eng I ‡	3	0	6	3
Science	Science Elective II (1)	2	3	7	3
G.E.	General Elective (2)	3	0	6	3
TOTAL		**16**	**6**	**35**	**18**

Senior Year					
Term VII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
SYS 402	Innovative Sys Design ‡	3	0	6	3

SYS/CPE 493	Data and Comp Comm ‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
E 423	Engineering Design VII‡	1	7	4	3
T.G.	Technogenesis core**	3	0	6	3
SyS/CpE xxx	Knowledge and Data Mining ‡	3	0	6	3
Total		**16**	**7**	**34**	**18**
Term VIII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
T.E.	Technical Elective ‡	3	0	6	3
T.E.	Technical Elective ‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
E 424	Engineering Design VIII ‡	1	7	4	3
Hu	Humanities	3	0	6	3
TOTAL		**13**	**7**	**28**	**15**

** Core option – specific course determined by engineering program
‡ Discipline specific course
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Naval Engineering

Naval Engineering is a broad-based engineering discipline that involves the design, construction, operation and maintenance of surface and sub-surface ships, ocean structures and shore facilities. Although these vessels and facilities are traditionally employed in the defense of the nation, many are also employed in the support of the civilian (commercial) Marine Transportation System. Because of the complexities of today's naval and civilian vessels and supporting infrastructure, the Naval Engineer must possess a strong background in the physical sciences, mathematics and modeling, as well as the more specialized fields of naval architecture, marine engineering, systems engineering and environmental engineering.

Mission and Objectives

The mission of the naval engineering program at Stevens is to develop innovative engineers capable of international leadership in the profession. The educational program emphasizes design innovation, trans-disciplinary study, a systems perspective on complex ship and infrastructure designs, lifelong learning and opportunities for international study and internships. As is the case for the other Stevens engineering programs, the naval engineering program includes a broad-based core engineering curriculum and a substantial experience in the humanities.

The program is conducted in concert with the Stevens leadership in the Office of Naval Research–sponsored *Atlantic Center for the Innovative Design and Control of Small Ships* and in collaboration with University College London.

The objectives of the naval engineering program are provided in terms of our expectations for our graduates. Within several years of graduation, they will:

- Be recognized as among the most innovative designers and project managers in the world;
- Be thoroughly aware of, and knowledgeable in dealing with environmental, social, ethical and economic impacts of their projects;
- Augment their knowledge through professional and cultural continuing education;
- <![endif]> Be active in leadership roles within their professional and technical societies

Engineering with a concentration in Naval Engineering

Building on its research strengths and long-term leadership in the fields of Naval Architecture and Ocean Engineering, Stevens is well-positioned to offer a unique program in Naval Engineering under the auspices of the broad-based Engineering curriculum. The program is offered as a concentration under the Engineering program and makes extensive use of the Davidson Laboratory's world-class experimental and modeling facilities. Emphasis is on the applied sciences and engineering courses that provide the groundwork for true innovation in ship design. The program culminates in a comprehensive, one-year ship design project that includes hands-on physical modeling in the towing tank and computer modeling using CFD codes resident in the Laboratory.

ENGINEERING – Concentration in Naval Engineering

Course Sequence

Freshman Year					
Term I					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ch 115	General Chemistry I	3	0	6	3
Ch 117	General Chemistry Lab I	0	3	0	1
Ma 115	Math Analysis I	3	0	6	3
E 101	Eng. Experiences I #	1	0	0	0
E 121	Engineering Design I	0	3	2	2
E 120	Engineering Graphics	0	2	2	1
E 115	Intro. To Programming	1	1.5	3	2
Hu	Humanities	3	0	6	3
	# credit applied in E102				
TOTAL		**11**	**9.5**	**25**	**15**
Term II					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Science	Science Elective I (1)	3	0	6	3
E 102	Eng. Experiences II #	1	0	0	1
Ma 116	Math Analysis II	3	0	6	3
PEP 111	Physics I	3	0	6	3
E 122	Engineering Design II	0	3	3	2
Hu	Humanities	3	0	6	3

	# credit for E101 & 102				
TOTAL		**13**	**3**	**27**	**15**

Sophomore Year

Term III

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 221	Differential Equations	4	0	8	4
PEP 112	Physics II	3	0	6	3
E 126	Mechanics of Solids	4	0	8	4
E 245	Circuits & Systems	2	3	7	3
E 231	Engineering Design III	0	3	2	2
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**37**	**19**

Term IV

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 227	Multivariate Calculus	3	0	6	3
	OR approved alternative**				
E 232	Engineering Design IV	2	3	7	3
E 234	Thermodynamics**	3	0	6	3
Science	Science Elective II (1)	2	3	7	3
CE373	Structural Analysis	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**16**	**6**	**38**	**18**

Junior Year

Term V

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
ME342	Transport/Fluid Mech. **	3	3	6	4
E 344	Materials Processing	3	0	6	3
E 321	Engineering Design V	0	3	2	2

E 243	Prob. & Statistics	3	0	6	3
OExxx	Intro. to Ship Design and Shipbuilding	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**15**	**6**	**32**	**18**
Term VI					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
OE528	Computer Aided Ship Design	3	0	6	3
E 355	Engineering Economics	3	3	6	4
E 322	Engineering Design VI (Ship Design)	1	3	5	2
OE525	Principles of Naval Architecture	3	0	6	3
OExxx	Marine Structures	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
TOTAL		**16**	**6**	**35**	**18**
Senior Year					
Term VII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
T.E.	Technical Elective ‡	3	0	6	3
OE527	Laboratory in Naval Architecture	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
E 423	Engineering Design VII (Ship Design)	1	7	4	3
T.G.	Technogenesis core**	3	0	6	3
OExxx	Total Ship Design	3	0	6	3
Total		**16**	**7**	**34**	**18**
Term VIII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
T.E.	Technical Elective ‡	3	0	6	3
OExxx	Total Ship Design	3	0	6	3
G.E.	General Elective (2)	3	0	6	3

E 424	Engineering Design VIII(Ship Design)	1	7	4	3
Hu	Humanities	3	0	6	3
TOTAL		**13**	**7**	**28**	**15**

** Core option – specific course determined by engineering program
‡ Discipline specific course
(1) Basic Science electives – note: engineering programs may have specific requirements
- one elective must have a laboratory component
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Participation in varsity sports can be used to satisfy the full P.E. requirement.

Participation in supervised, competitive club sports can be used to satisfy up to two credits of the P.E. requirement with approval from the P.E. Coordinator.

English Language Proficiency

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Engineering with a Concentration in Biomedical Engineering

Freshman Year				
Term I				
	Hrs. Per Wk.			
	Class	Lab	Study	Sem. Cred.

Ch 115	General Chemistry I	3	0	6	3
Ch 117	General Chemistry Lab I	0	3	0	1
Ma 115	Math Analysis I	3	0	6	3
E 101	Eng. Experiences I #	1	0	0	0
E 121	Engineering Design I	0	3	2	2
E 120	Engineering Graphics	0	2	2	1
E 115	Intro. To Programming	1	1.5	3	2
Hu	Humanities	3	0	6	3
	# credit applied in E102				
TOTAL		**11**	**9.5**	**25**	**15**

Term II

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ch 116	General Chemistry II (1)	3	0	6	3
Ch 118	Gen. Chem. Lab II (1)	0	3	0	1
E 102	Eng. Experiences II #	1	0	0	1
Ma 116	Math Analysis II	3	0	6	3
PEP 111	Physics I	3	0	6	3
E 122	Engineering Design II	0	3	3	2
Hu	Humanities	3	0	6	3
	# credit for E101 & 102				
TOTAL		**13**	**6**	**27**	**16**

Sophomore Year

Term III

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 221	Differential Equations	4	0	8	4
PEP 112	Physics II	3	0	6	3
E 126	Mechanics of Solids	4	0	8	4
E 245	Circuits & Systems	2	3	7	3
E 231	Engineering Design III	0	3	2	2
Hu	Humanities	3	0	6	3

TOTAL		**16**	**6**	**37**	**19**

Term IV

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ma 227	Multivariate Calculus	3	0	6	3
	OR approved alternative**				
E 232	Engineering Design IV	2	3	7	3
E 234	Thermodynamics	3	0	6	3
BME 306	Introduction to BME	3	0	6	3
Ch 281	Biology and Biotechnology	3	0	6	3
Hu	Humanities	3	0	6	3
TOTAL		**17**	**3**	**37**	**18**

Junior Year

Term V

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
Ch 241	Organic Chemistry I	3	4	6	4
E 344	Materials Processing	3	0	6	3
E 321	Engineering Design V	0	3	2	2
ME 342	Fluid Mechanics	3	3	6	4
Ch 381	Cell Biology	3	3	6	4
Hu	Humanities	3	0	6	3
TOTAL		**15**	**13**	**32**	**20**

Term VI

		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
E 355	Engineering Economics	3	3	6	4
ME 322	Design VI ‡	1	3	5	2
ME 255	Dynamics	3	0	6	3
Ch 382	Biological Systems	3	3	6	4
Ch 242	Organic Chemistry II (1)	3	4	6	4
G.E.	General Elective (2)	3	0	6	3

(1) Required for BME Majors in place of Basic Science Elective					
TOTAL		**16**	**13**	**29**	**20**

Senior Year					
Term VII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
G.E.	General Elective (2)	3	0	6	3
	Elective	3	0	6	3
ME 423	Design VII ‡a	0	8	4	3
T.G.	Technogenesis core**	3	0	6	3
E243	Probability and Statistics	3	0	6	3
T.E.	Technical Elective‡	3	0	4	3
Total		**12**	**8**	**32**	**18**
Term VIII					
		Hrs. Per Wk.			
		Class	Lab	Study	Sem. Cred.
ME 345	Modeling and Simulation	3	0	6	3
TE	Technical Elective‡	3	0	6	3
G.E.	General Elective (2)	3	0	6	3
ME 424	Design VIII ‡a	1	7	4	3
Hu	Humanities	3	0	6	3
TOTAL		**13**	**7**	**28**	**15**

** Core option – specific course determined by engineering program
‡ Discipline specific course
a Biomedical Engineering oriented Senior Design Project required
(1) Basic Science electives – note: engineering programs may have specific requirements
- one elective must have a laboratory component
- two electives from the same science field cannot be selected
(2) General Education Electives – chosen by the student
- can be used towards a minor or option
- can be applied to research or approved international studies

GRADUATION REQUIREMENTS

The following are requirements for graduation of all engineering students and **are not included for academic credit**. They will appear on the student record as pass/fail.

Physical Education

All engineering students must complete a minimum of three semester credits of

Physical Education (P.E.). A large number of activities are offered in lifetime, team and wellness areas. Students must complete at least one course in their first semester at Stevens; the other two can be completed at any time, although it is recommended that this be done within the first half of the student's program of study. Students can enroll in more than the minimum required P.E. for graduation and are encouraged to do so.

Participation in varsity sports can be used to satisfy the full P.E. requirement.

Participation in supervised, competitive club sports can be used to satisfy up to two credits of the P.E. requirement with approval from the P.E. Coordinator.

English Language Proficiency

All students must satisfy an English Language proficiency requirement.

PLEASE NOTE: *A comprehensive Communications Program will be implemented for the Class of 2009. This may influence how the English Language Proficiency requirement is met. Details will be added when available.*

DOUBLE DEGREE PROGRAM

Students may elect to pursue a B.E. Degree concurrently with a B.S. Degree, or a second B.E. Degree You must satisfy all of the requirements for both degrees (including two Senior Design sequences for the case of two B.E. degrees), and to have completed at least 24 credits beyond the higher of the two program requirements. Two Study Plans are required for this option.

Core Curriculum

E101 & 102 Engineering Experiences I & II
(1-0-1)

This is a two-semester course that consists of a set of engineering experiences such as lectures, small group sessions, on-line modules and visits. Students are required to complete a specified number of experiences each semester and are given credit at the end of the semester. The goal is to introduce students to the engineering profession, engineering disciplines, college success strategies, Stevens research and other engaging activities and to Technogenesis.

E 115 Introduction to Programming for Engineers
(1-1.5-2)

An introduction to the use of an advanced programming language for use in engineering applications, using C++ as the basic programming language and MicroSoft Visual C++ as the program development environment. Topics covered include basic syntax (data types and structures, input/output instructions, arithmetic instructions, loop constructs, functions, subroutines, etc.) needed to solve basic engineering problems as well as an introduction to advanced topics (use of files, principles of objects and classes, libraries, etc.). Algorithmic thinking for development of computational programs and control programs from mathematical and other representations of the problems will be developed. Basic concepts of computer architectures impacting the understanding of a high-level programming language will be covered. Basic concepts of a microcontroller architecture impacting the use of a high-level programming language for development of microcontroller

software will be covered, drawing specifically on the microcontroller used in E121 (Engineering Design I). Corequisite: E121.

E 120 Engineering Graphics
(0-2-1)
Engineering graphics: principles of orthographic and auxiliary projections, pictorial presentation of engineering designs, dimensioning and tolerance, sectional and detail views, assembly drawings. Descriptive geometry. Engineering figures and graphs. Solid modeling introduction to computer-aided design and manufacturing (CAD/CAM) using numerically-controlled (NC) machines.

E 121 Engineering Design I
(0-3-2)
This course introduces students to the process of design and seeks to engage their enthusiasm for engineering from the beginning of the program. The engineering method is used in the design and manufacture of a product. Product dissection is exploited to evaluate how others have solved design problems. Development is started on competencies in professional practice topics, primarily: effective group participation, project management, cost estimation, communication skills and ethics. Engineering Design I is linked to and taught concurrently with the Engineering Graphics course. Engineering graphics are used in the design projects and the theme of "fit to form" is developed. Corequisite: E 115, E 120.

E 122 Engineering Design II
(0-3-2)
This course continues the freshman year experience in design. The engineering method introduced in Engineering Design I is reinforced. Further introduction of professional practice topics are linked to their application and testing in case studies and project work. Prerequisite: E 121.

E 126 Mechanics of Solids
(4-0-4)
Fundamental concepts of particle statics, equivalent force systems, equilibrium of rigid bodies, analysis of trusses and frames, forces in beam and machine parts, stress and strain, tension, shear and bending moment, flexure, combined loading, energy methods, statically indeterminate structures. Prerequisites:PEP 111, Ma 115.

E 127 Mechanics of Solids (Statics Module)
Fundamental concepts of particle statics, equivalent force systems, equilibrium of rigid bodies, analysis of trusses and frames, forces in beam and machine parts, stress and strain, tension, shear and bending moment, flexure, combined loading, energy methods, statically indeterminate structures. Prerequisites: PEP 111, Ma 115.

E 128 Mechanics of Solids (Strength of Materials Module)
Fundamental concepts of particle statics, equivalent force systems, equilibrium of rigid bodies, analysis of trusses and frames, forces in beam and machine parts, stress and strain, tension, shear and bending moment, flexure, combined loading, energy methods, statically indeterminate structures. Prerequisites: PEP 101 or PEP 111, Ma 115, E 127.

E 231 Engineering Design III
(0-3-2)

This course continues the experiential sequence in design. Design projects are linked with Mechanics of Solids topics taught concurrently. Core design themes are further developed. Prerequisite: E 122. Corequisites: E 126.

E 232 Engineering Design IV
(2-3-3)
This course continues the experiential sequence in design. Design projects are in, and lectures address the area of Electronics and Instrumentation. Core design themes are further developed. Prerequisite: E 231 and E 245.

E 234 Thermodynamics
(3-0-3)
Concepts of heat and work, First and Second Laws for closed and open systems including steady processes and cycles, thermodynamic properties of substances and interrelationships, phase change and phase equilibrium, chemical reactions and chemical equilibrium, representative applications. Prerequisites: PEP 111, Ch 115, Ma 115.

E 243 Probability and Statistics for Engineers
(3-0-3)
Descriptive statistics, pictorial and tabular methods, measures of location and of variability, sample space and events, probability and independence, Bayes' formula, discrete random variables, densities and moments, normal, gamma, exponential and Weibull distributions, distribution of the sum and average of random samples, the central limit theorem, confidence intervals for the mean and the variance, hypothesis testing and p-values, applications for prediction in a regression model. A statistical computer package is used throughout the course for teaching and for project assignments. Prerequisite: Ma 116.

E 245 Circuits and Systems
(2-3-3)
Ideal circuit elements; Kirchoff laws and nodal analysis; source transformations; Thevenin/Norton theorems; operational amplifiers; response of RL, RC and RLC circuits; sinusoidal sources and steady state analysis; analysis in frequenct domain; average and RMS power; linear and ideal transformers; linear models for transistors and diodes; analysis in the s-domain; Laplace transforms; transfer functions. Prerequisite: PEP 112. Corequisite: Ma 221.

E 246 Electronics and Instrumentation
(3-0-3)
Review of AC analysis, phasors, power, energy, node equations, transformers, maximum power transfer, Laplace transforms; Fourier series and transforms; filters; Bode plots; op-amps, ideal, difference, summing, integrating; Wheatstone bridge; strain gauge; position & pressure transducers; thermistors; instrumentation amplifiers; ideal diodes, full & ½ wave rectifiers; battery eliminator design; non-ideal diodes, non-linear analysis; junction transistors, DC models, saturation and cut-off; Boolean algebra; logic gates; A to D converters. Prerequisite: E 245. NOTE: this course will be phased out as the lecture material has been incorporated into E232 for the Class of 2009 on.

E 321 Engineering Design V
(0-3-2)

This course includes both experimentation and open-ended design problems that are integrated with the Materials Processing course taught concurrently. Core design themes are further developed. Corequisite: E 344.

E 322 Engineering Design VI
[discipline specific]
(1-3-2)
This course allows each discipline to address design topics specific to their discipline. The latter part of this course is structured to allow for project selection, team formation and preparation of a proposal suitable for submission to a potential sponsor for the senior design capstone project. Core design themes are further developed. Prerequisite: E 321. Corequisites: E 345 (discipline specific) and E 355.

E 342 Transport/Fluid Mechanics
[discipline specific]
(3-3-4)
Offered as a specific departmental course; e.g., see ME departmental listing.

E 344 Materials Processing
(3-0-3)
An introduction is provided to the important engineering properties of materials, to the scientific understanding of those properties and to the methods of controlling them. This is provided in the context of the processing of materials to produce products. Prerequisite: Ch 115 and Ch 117.

E 345 Modeling and Simulation
[discipline specific]
(3-0-3)
Development of deterministic and non-deterministic models for physical systems, engineering applications, simulation tools for deterministic and non-deterministic systems, case studies and projects.

E 355 Engineering Economics
(3-3-4)
Basics of cost accounting and cost estimation, cost-estimating techniques for engineering projects, quantitative techniques for forecasting costs, cost of quality. Basic engineering economics, including capital investment in tangible and intangible assets. Engineering project management techniques, including budget development, sensitivity analysis, risk and uncertainty analysis and total quality management concepts. Prerequisites: E 121, E 122, E 231 and E 232.

E 400 Research in Engineering
(up to 6 credits total)
Individual research investigation under the guidance of a faculty advisor. Hours/credits to be arranged. A final report/thesis and a formal presentation in a seminar/conference is required. Prerequisite: Senior standing.

E 421 Entrepreneurial Analysis of Engineering Design
(1-3-2)
This course provides students with tools needed to commercialize their senior design technology. Topics include engineering economic analysis and issues of marketing, venture capital, intellectual property and project management. These topics are from

the view of an entrepreneur who is creating knowledge that can be licensed and/or used in a start-up business. These topics are critical elements in implementing Technogenesis. Prerequisites: E 355 and E 321. Note: this course will be replaced by a TG core course for the Class of 2009 on.

E 423-424 Engineering Design VII-VIII
[discipline specific]
(1-7-3) (1-7-3)
Senior design capstone courses include a capstone project spanning two semesters. Prerequisite: Senior standing.