

Stevens Institute of Technology 2006-2007 Catalog

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The Arthur E. Imperatore School of Sciences and Arts



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Undergraduate Programs

UNDERGRADUATE PROGRAM

The Imperatore School of Sciences and Arts (ISSA) is a dynamic teaching, learning and research community. As part of a multifaceted mission, ISSA is proud of its commitment to providing exciting, top-quality programs for undergraduates at Stevens to study sciences, computer science and the humanities. The quality of our programs derives from the quality of our world-class faculty. Undergraduate students are a welcomed part of our community. They are afforded ready access to faculty and to ongoing research activities on campus and off campus, and, as they pursue their studies, undergraduates are encouraged to participate in research and Technogenesis activities.

The faculty at ISSA has recently revised our offerings to emphasize project-based learning, to promote and reward independent study and scientific initiative, to expand research opportunities for undergraduates, and to promote the undergraduate thesis as a capstone for an undergraduate course of study. These changes are reflected in this catalog, and they are designed to enhance the undergraduate experience of the student with a serious interest in studying the sciences, computer science and the humanities.

Three distinct curricula define our undergraduate program: the Bachelor of Science in the natural sciences, the Bachelor of Science in computer science, and the Bachelor of Arts for study in the humanities and social sciences.

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BACHELOR OF SCIENCE (Natural Sciences)

The science program at Stevens offers a remarkable opportunity for a career in today's scientific world. It prepares you to work at the frontiers of knowledge and to make significant contributions to science and the well-being of mankind. Careers in biology, chemistry, medicine, physics, mathematics and statistics, among others, are accessible through the science program.

The concepts, techniques and attitudes that are common to all sciences form the core courses of the Science program. You develop an awareness of the interactions among the various scientific disciplines and their individual contributions to the advancement of knowledge - the total picture of science. Additional courses in a chosen concentration prepare you exceptionally well with both the tools and knowledge to enter a profession immediately upon graduation, or to embark on advanced study leading to a graduate degree.

Studies during your freshman year include courses in biology, chemistry, computer science, mathematics and physics, and a sequence of courses in humanities. Studies in the humanities continue throughout the four-year program. In the next three years you may choose a concentration in the area of chemistry, chemical biology, mathematics, computational science or physics. Upon successful completion of your

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studies, you are awarded the Bachelor of Science degree.

The minimal formal requirements for the science program are listed in the semester-by-semester schedule, including the Notes. Courses may be taken in a different order than listed. Consult the individual department schedule for more specific details.

Freshman Year

Term I

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Hu	Humanities (Group A or B)*	3	0	3
Ma 115	Calculus I	3	0	3
PEP 111	Mechanics	3	0	3
CS 105	Intro. to Scientific Computing	2	2	3
<i>OR</i>				
CS 115	Intro. to Computer Science	3	2	4
Ch 115	General Chemistry I	3	0	3
Ch 117	General Chemistry Lab I	0	3	1
PE 200	Physical Education I	0	2	1
TOTAL		14 (15)	7	17(18)

Term II

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Hu	Humanities (Group A or B)*	3	0	3
Ma 116	Calculus II	3	0	3
PEP 112	Electricity and Magnetism	3	0	3
Ch 281	Biology and Biotechnology	3	0	3
Ch 116	General Chemistry II	3	0	3
Ch 118	Gen. Chemistry Lab II	0	3	1
PE 200	Physical Education II	0	2	1
TOTAL		15	5	17

Sophomore Year

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Term III

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Hu	Humanities (Group A or B)*	3	0	3
Mgt 221	Differential Equations	4	0	4
TE	Economics ***	3	0	3
TE	Technical Elective	3	0(4)	3(4)
PEP 221	Physics Lab I	0	3	1
PE 200	Physical Education III	0	2	1
TOTAL		13	5(9)	15(16)

Term IV

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Hu	Humanities (Group A or B)*	3	0	3
SE	Science Elective **	3	3	3
	Thermodynamics †	3	0	3
TE	Technical Elective	3	0(4)	3(4)
PEP 222	Physics Lab II	0	3	1
PE 200	Physical Education IV	0	2	1
TOTAL		12	8(12)	14(15)

Junior Year

Term V

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Hu	Humanities	3	0	3
TE	Technical Elective	3	0	3
TE	Technical Elective	3	0(3)	3(4)
TE	Technical Elective	3	0(4)	3(4)
PE 200	Physical Education V	0	2	1
TOTAL		12	2(9)	13(15)

		Term VI		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities	3	0	3
PEP 242	Modern Physics	3	0	3
Ma 222	Probability & Statistics	3	0	3
TE	Technical Elective	3	0(3)	3(4)
PE 200	Physical Education VI	0	2	1
TOTAL		12	2(5)	13(14)

Senior Year

		Term VII		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities	3	0	3
TE	Technical Elective	3	0(3)	3(4)
TE	Technical Elective	3	0(3)	3(4)
TE	Technical Elective	3	0	3
E	Elective	3	0	3
TOTAL		15	0(6)	15(17)

		Term VIII		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities	3	0	3
TE	Technical Elective	3	0(3)	3(4)
TE	Technical Elective	3	0(3)	3(4)
TE	Technical Elective	3	0	3
E	Elective	3	0	3
TOTAL		15	0(6)	15(17)

Notes:

* In the first two years, students must choose two courses from Group A and two courses from Group B.

** The Science Elective must be chosen from:

Ma 227 Multivariable Calculus 3-0-3

Ch 382 Biological Syst 3-3-4

*** Mgt 243 Macroeconomics or Mgt 244 Microeconomics.

† Thermodynamics may be Ch 321 or E 234.

One of the Technical Electives may be a Management course with the approval of the advisor.

Departments may rearrange the placement of courses such as Thermodynamics, Quantum Physics, Probability & Statistics, Economics, etc., to accommodate elective sequences within the constraints of normal departmental course offerings.

Junior and senior Humanities courses must be 300-level or higher.

All students must satisfy an English Language proficiency requirement as described in this catalog.

BACHELOR OF SCIENCE (Computer Science)

The importance of computers has grown steadily and spectacularly. Now, all fields of science and all aspects of society are affected by what computers can do: computation, record keeping, automatic control, computer-mediated communication and interaction and many other tasks.

The Stevens computer science curriculum gives the student a solid foundation in all basic topics of the field - mathematical, software and hardware - and provides several electives to allow wider exploration or specialization. The curriculum culminates with a capstone course in which students tackle an industrially-relevant design problem. B.S. graduates enjoy unusually varied career opportunities in many different industries, and are well prepared for graduate study.

The formal requirements for the computer science program are listed in the following semester-by-semester schedule, including the Notes.

Freshman Year**Term I**

Hrs. Per Wk.		
Class	Lab	Sem. Cred.

Ma 115	Calculus I	3	0	3
CS 115	Intro. to Computer Science	3	2	4
PEP 111	Mechanics	3	0	3
Ch 115	General Chemistry I	3	0	3
Ch 117	General Chemistry Lab I	0	3	1
Hu	Humanities	3	0	3
PE 200	Physical Education I	0	2	1
TOTAL		15	7	18

Term II

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
Ma 116	Calculus II	3	0	3
CS 284	Data Structures & Alg. I	3	0	3
MA 134	Discrete Math	3	0	3
Ch 281	Biology & Biotechnology	3	0	3
Ch 282	Intro. Biology Lab	0	3	1
Hu	Humanities	3	0	3
PE 200	Physical Education II	0	2	1
TOTAL		15	5	17

Sophomore Year**Term III**

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 383	Comp. Org. & Prog.	3	2	4
CS 385	Data Str. & Alg. II	3	0	3
CS 335	Computer Structures	3	0	3
Hu	Humanities	3	0	3
Hu	Humanities	3	0	3
PE 200	Physical Education III	0	2	1
TOTAL		15	4	17

Term IV

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 488	Comp. Architecture	3	0	3
CS 434	Theory of Computation	3	0	3
	Elective*	3	0	3
Ma 222	Probability & Statistics	3	0	3
Hu	Humanities	3	0	3
PE 200	Physical Education IV	0	2	1
TOTAL		15	2	16

Junior Year**Term V**

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 492	Operating Systems	3	0	3
CS 496	Programming Languages	3	0	3
	Elective*	3	0	3
Hu	Humanities	3	0	3
PE 200	Physical Education V	0	2	1
TOTAL		12	2	13

Term VI

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 442	Database Mgmt. Systems	3	0	3
CS 494	Compiler Design	3	0	3
	Elective*	3	0	3
Hu	Humanities	3	0	3
PE 200	Physical Education VI	0	2	1
TOTAL		12	2	13

Senior Year**Term VII**

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 551	Software Eng. & Pract. I	3	1	3

CS	CS Elective	3	0	3
	Elective*	3	0	3
	Elective*	3	0	3
Hu	Humanities	3	0	3
	TOTAL	15	1	15

Term VIII

		Hrs. Per Wk.		
		Class	Lab	Sem. Cred.
CS 552	Software Eng. & Pract. II	3	1	3
CS	CS Elective	3	0	3
	Elective*	3	0	3
	Free Elective	3	0	3
Hu	Humanities	3	0	3
	TOTAL	15	1	15

Notes:

Humanities Electives must include at least one of these courses: HPL 339, HPL 455, HSS 371, HHS 429.

* Must include a total of six electives, of which one must either be Mgt 243, Mgt 111 or BT 121; one must be a science elective; and the remaining four must be CS courses or courses from a department-approved Application Area sequence.

Descriptions of the various concentrations and their requirements and options, where offered, appear in the section on Academic Departments. With each description, there is a sample schedule; you may see at what point you take the electives that form the concentration. Indicated above each sample is the elective sequence it depicts.

BACHELOR OF SCIENCE (Information Systems)

The Bachelor of Science program in Information Systems is designed for students who would like to acquire the background needed to apply information technology to support the major functions of a business. People who manage information systems must have both business and technical knowledge. They must understand organizational structure, objectives, and operations. They must also understand system development tools, information architecture, network configuration, database management, and systems integration. The program in Information Systems combines a strong background in the fundamentals of computer science with basic business management courses.

The course sequence for Information Systems is currently available from the website for the Department of Computer Science, <http://www.cs.stevens.edu>.

BACHELOR OF ARTS

Stevens offers a distinctive B.A. degree program in the humanities. You can earn a traditional liberal arts degree in one of five fields of the humanities - English and American literature, history, philosophy, science and technology studies, or an interdisciplinary program of study - and complement it with a secondary concentration in the sciences, including computer science, as well as management, pre-medicine, or another humanities or social science subject. An Individualized Major is also an option with programs in Art & Technology, Music & Technology, American Studies and Turkish & Middle Eastern Studies. Thus, in addition to pursuing studies in one of the autonomous humanistic disciplines, you can also achieve a significant competence in a scientific, technological, or professional field. This degree program serves as a bridge between the two cultures - the literary-humanistic and the scientific-technological - and prepares you upon graduation, in a unique way, for the professional world of the future.

In the first two years you study the broad core that includes various sequences chosen among literature, history, philosophy and social sciences, together with courses in computing, mathematics and the

sciences. During this time, you also identify two areas of concentration. The major concentration must be in one of the humanistic fields.

For a secondary concentration you may build on the basic courses in computing, mathematics and science, and draw on the resources and courses available in other departments at Stevens. Secondary concentration programs have been prepared in computer science, economics, management, mathematics, physics and environmental engineering, as well as programs suitable for pre-law and pre-medical studies. Or you may complete a minor in a second field of the humanities or social sciences.

The last two years of the program are focused on the major and secondary concentrations, and a Senior Thesis is required as a culmination of the major concentration. While a limited number of electives are designated for the secondary concentration, the open electives can be utilized if greater depth is desired in the field.

The formal requirements for the humanities program are listed in the following semester-by-semester schedule, including the Notes.

Freshman Year

		Term I		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities A*	3	0	3
Hu	Humanities B*	3	0	3
CS 105	Intro to Scientific Computing	2	2	3
<i>OR</i>				
CS 115	Intro to Computer Science	3	2	4
		Mathematics		
		Or		
		Science		
PE 200	Physical Education I	0	2	1
		TOTAL	11(12)	4(7) 13(15)

		Term II		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities A*	3	0	3
Hu	Humanities B*	3	0	3
Hu	Major Concentration	3	0	3
		Economics or Psychology		
		Mathematics		
		Or		
		Science		
PE 200	Physical Education II	0	2	1
		TOTAL	15	2(5) 16(17)

Sophomore Year

		Term III		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities A*	3	0	3
Hu	Humanities B*	3	0	3
		Mathematics		
		Or		
		Science §		
		Secondary Concentration •		
		Elective		
PE 200	Physical Education III	0	2	1
		TOTAL	15	2(8) 16(18)

		Term IV		
		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Humanities A*	3	0	3
Hu	Humanities B*	3	0	3
		Mathematics		

	Or			
	Science §	3	0(3)	3(4)
	Secondary Concentration •	3	0(3)	3(4)
	Elective	3	0	3
PE 200	Physical Education IV	0	2	1
	TOTAL	15	2(8)	16(18)

Junior Year**Term V**

		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Major Concentration	3	0	3
Hu	Major Concentration	3	0	3
	Secondary Concentration	3	0	3
	Elective	3	0	3
	Elective	3	0	3
PE 200	Physical Education V	0	2	1
	TOTAL	15	2	16

Term VI

		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hum 301	Writing Seminar	3	0	3
Hu	Major Concentration	3	0	3
	Major Concentration	3	0	3
	Secondary Concentration	3	0	3
	Elective	3	0	3
PE 200	Physical Education VI	0	2	1
	TOTAL	15	2	16

Senior Year**Term VII**

		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu	Major Concentration	3	0	3
Hu	Major Concentration	3	0	3
	Secondary Concentration	3	0	3
	Elective	3	0	3
	Elective	3	0	3
	TOTAL	15	0	15

Term VIII

		Class	Hrs. Per Wk.	
			Lab	Sem. Cred.
Hu 498	Senior Thesis	4	0	4
Hu	Major Concentration	3	0	3
	Elective	3	0	3
	Elective	3	0	3
	TOTAL	13	0	13

Notes:

* A year-long sequence from Group A: Literature and Philosophy and a year-long sequence from Group B: History and Social Science is required for each of the first two years.

§ One year of Mathematics is required. One year of Science courses is required (either 3-0-3 or 3-3-4). In the program schedule it is assumed the Mathematics courses are taken in the Freshman year and the Science courses in the Sophomore year, but the order may be reversed if prerequisites are met.

• Secondary concentration courses and electives can be 3-0-3 or 3-3-4.

All students must satisfy an English Language proficiency requirement as described in this catalog.

DOUBLE DEGREE PROGRAM

You may also elect to pursue a B.A. degree concurrently with a B.E. degree or a B.S. degree in one of the sciences. For example, you may earn a B.E. in environmental engineering and a B.A. in history, or a B.S. in chemical biology and a B.A. in philosophy, or a combination of a B.E. or B.S. degree with a B.A. degree in one of the three other humanities concentrations. Normally this would require eight additional courses and a senior thesis. At Stevens, you have the opportunity to consult advisors in the humanities department in your selection of courses for such a double degree program.

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