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School of Humanities and Social Sciences

Dean: John P. Harrington

Associate Dean of Undergraduate Programs and Curriculum Initiatives: C.L. Odell

Associate Dean of Graduate Programs and Research Initiatives: (vacant)

Director of Student Services: Elizabeth Large

Director of Program Development: Dean Button

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School of Humanities and Social Sciences Home Page: <http://www.rpi.edu/dept/hss/>

In an historic technological institution, the Rensselaer School of Humanities and Social Sciences (H&SS) offers exciting new institute research areas as well as broad university educational opportunities. The School's five departments offer innovative and interdisciplinary programs of study at both the undergraduate and graduate levels. The undergraduate programs include: majors in humanities, social science, and arts disciplines; collaborations and dual majors for students of all schools; and a core curriculum that is a common element in the course of study for all Rensselaer students. The graduate programs in H&SS offer unique opportunities for study of the technological world, its impact on society, and its potential contributions to social, cultural, and artistic goals. All H&SS students have a broad choice of electives representing Rensselaer's global vision and commitment to personal excellence through new studies in arts, communications, and culture studies as well as to the traditional areas of liberal arts and social sciences.

H&SS programs at Rensselaer give every student close contact with outstanding faculty members. Those faculty—scholars and practitioners themselves—create programs that are distinctive for research applications at both the undergraduate and graduate levels, field work and studio experiences, internships and professional co-op opportunities, outstanding electronic laboratories and computer facilities, and, above all, opportunities to cross boundaries and to develop new interdisciplinary projects. These programs integrate the intellectual depth and the practical experience needed for leadership careers in business, non-profit corporations, government and government-related organizations, higher education, and arts. Our students do not only participate in the technological world: they create it, and they shape it.

Undergraduate and graduate degree programs are offered in five-degree granting departments, including Arts; Cognitive Science; Economics; Language, Literature, and Communication; and Science and Technology Studies. In addition, students can major in interdisciplinary programs that integrate scientific and technical tools with the arts, social sciences, communication, and humanities. These include Electronic Media, Arts, and Communication (EMAC); Minds and Machines; Product Design and Innovation (PDI); and Ecological Economics, Values, and Policy (EEVP).

Degrees Offered and Associated Departments

Communication	Language, Literature, and Communication
Communication and Rhetoric	Language, Literature, and Communication
Ecological Economics	Economics
Ecological Economics, Values, and Policy	Interdisciplinary
Economics	Economics
Electronic Arts	Arts
Electronic Media, Arts, and Communication	Interdisciplinary
Minds and Machines	Interdisciplinary
Philosophy	Cognitive Science
Product Design and Innovation	Interdisciplinary
Psychology	Cognitive Science
Science, Technology, and Society	Science and Technology Studies
Science and Technology Studies	Science and Technology Studies
Technical Communication	Language, Literature, and Communication

Overview of Undergraduate Programs

Individual departments in the School of Humanities and Social Sciences offer a variety of Bachelor of Science degree programs. H&SS currently offers departmental degree programs in Communication, Economics, Electronic Arts, Philosophy, Psychology, and Science and Technology Studies.

In addition, a number of interdisciplinary programs are also available. These programs are offered jointly between two or more departments within the school or with other Institute schools. H&SS interdisciplinary degree programs include the following, all of which are explained in greater detail under the heading Interdisciplinary Programs and Research at the end of the H&SS section of this catalog.

- **Electronic Media, Arts, and Communication (EMAC)** – The departments of Arts and of Language, Literature, and Communication (LL&C) offer this B.S. degree, which combines theory and practice through electronic media arts studio and theory courses.
- **Ecological Economics, Values, and Policy (EEVP)** – The departments of Economics and of Science and Technology Studies (STS) offer this B.S. degree. It combines ecological economics, environmental policy studies, and social and cultural theory and practice.
- **Minds and Machines (M&M)** – This B.S. degree based in the department of Cognitive Science includes substantial hands-on and research-based work in artificial intelligence, psychology, cognitive science, logic, and philosophy.
- **Product Design and Innovation (PDI)** – This innovative design program offers a dual major with three possibilities, Mechanical Engineering and STS, Engineering Science and STS, or Building Sciences and STS. This program combines engineering or architectural disciplines, STS courses, and design studios.

In all curriculum areas, H&SS strives to provide flexibility whenever possible. As part of this effort, the department offers the Independent Study Program, which fills specialized educational needs in areas that regular departmental offerings do not adequately serve. Independent Study is an individualized reading or research program that a student proposes to a faculty member whose expertise covers that area. Students interested in Independent Study must adhere to a number of conditions including:

- Demonstration of an ability to work independently as well as completion of the prerequisites needed to undertake the project successfully.
- Evidence that no equivalent course is available at Rensselaer or at any of the consortium institutions in the Capital District or that the student is unable to schedule such a course due to unusual curricular demands.
- The faculty member has sufficient time to supervise the proposed course of study.
- Development of a written agreement spelling out the scope of the work to be done, the expected deliverables, and the evaluation criteria to be applied.
- Provision of a description of the amount of work expected and an understanding that the level at which it is to be completed must be similar to the demands of an equivalent course.
- The ability of faculty members to place additional constraints on the participation in the Independent Study.

H&SS Core Program

As part of their B.S. degree program, all Rensselaer undergraduates take a selection of H&SS courses referred to as the H&SS core. This core is the foundation of undergraduate education. In it, students develop the skills necessary for personal and professional success, and they also begin to explore the social and cultural areas of study and issues of debate that are important in the global society of the twenty-first century.

The core consists of 24 credit hours, or six courses distributed to afford students a breadth of perspective across the various disciplines as well as a more in-depth experience in at least one area. Engineering students automatically take two of the 24 credit hours as professional development in their engineering design sequence and take a two-credit H&SS professional development course in their junior year.

To ensure breadth in the core courses, students must select at least two courses (eight credit hours) from each of the lists below.

Humanities	Code	Social Sciences	Code
Foreign Languages	LANG	Economics	ECON
Literature	LITR	Science and Technology Studies, Social Science	STSS
Communication	COMM	Psychology	PSYC
Writing	WRIT	Interdisciplinary Studies	IHSS
Arts	ARTS		
Philosophy	PHIL		
Science and Technology Studies, Humanities	STSH		
Interdisciplinary Studies	IHSS		

H&SS interdisciplinary courses may be substituted for courses in either category.

To ensure depth in the H&SS core, students must also take at least two courses within a single area code (STSH and STSS can be counted as a single area), at least one of which is taken at an advanced level (above 1000). No course within the depth sequence may be taken as Pass/No Credit.

No more than three 1000-level H&SS courses may be applied toward the H&SS core requirement, no more than six credits may be taken as Pass/No credit, and at least one course (four credits) must be at the 4000 level.

Students entering Rensselaer in their first year may transfer up to two H&SS courses (up to eight credit hours) toward their H&SS core requirement (including Advanced Placement credit). Transfer students from an accredited collegiate program who have completed at least one college year but who come to Rensselaer with first-year status may qualify for additional core transfers at the discretion of the H&SS curriculum adviser.

Transfer students entering Rensselaer at the sophomore level or above are not limited in the number of courses they may transfer for H&SS core credit. All others must take at least 16 credit hours of their H&SS core at Rensselaer.

Enrolled Rensselaer students wishing to take an H&SS course for credit at another accredited institution must obtain prior approval for the course from the core curriculum adviser. Applicants must furnish a catalog description of the proposed course and a completed copy of Rensselaer's Transfer Credit Approval form to the core curriculum adviser. A maximum of two courses (up to eight credit hours) of transfers is allowed (including AP courses).

Special Undergraduate Opportunities

Accelerated Prelaw Program – This opportunity is offered within the Department of STS in cooperation with Albany Law School and other law schools. For additional details, see the Science and Technology Studies section of this catalog.

Overview of Graduate Programs

The School of Humanities and Social Sciences offers both master's and doctoral level programs. In addition, it provides a selection of special certificate program opportunities.

Master's Programs

Within H&SS, three types of master's degrees are available. Among these is a 30-credit-hour M.S. degree, which is offered within the departments of Language, Literature, and Communication, Economics, and Science and Technology Studies.

Another 30-credit-hour Professional Master's program is intended for individuals already in the work force who are seeking a professional focus. Professional Master's are available in Ecological Economics, Values, and Policy (EEVP). Finally, H&SS offers a 60-credit-hour Master of Fine Arts in Electronic Arts through the Arts Department.

Doctoral Programs

Programs leading to the Doctor of Philosophy degree (Ph.D.) are offered in Cognitive Science, Ecological Economics, Science and Technology Studies, and Communication and Rhetoric. Individual courses and opportunities for directed study are also available in other areas.

Special Graduate Opportunities

Certificate Programs – The Department of LL&C offers two specialization certificates, one in Graphics and the other in Human-Computer Interaction, as options in the master's degree in technical communication.

The Arts

Chair: Kathy High

Director of Graduate Studies: Kathy High

Director of iEAR Studios: Curtis Bahn

Department Home Page: <http://www.arts.rpi.edu/>

The Department of the Arts offers a B.S. in Electronic Arts and a graduate program leading to an M.F.A. in Electronic Arts. Also offered jointly with the Department of Language, Literature, and Communication is a B.S. in Electronic Media, Arts, and Communication.

Within this department, studio courses engage students in hands-on activities that stress creative and expressive development. They also encourage students to develop their perceptual sensitivity, as well as build the confidence to apply creative exploration and problem-solving skills to a wide range of aesthetic challenges. In addition to a full complement of traditional disciplines such as drawing, painting, sculpture, music, and acting, the department offers courses in electronic media including digital video, computer imaging and animation, interactivity, virtual reality, multimedia installation, and computer music.

Rensselaer's Master of Fine Arts offers a unique emphasis on integrating a variety of electronic arts disciplines into a single curriculum. Building upon undergraduate backgrounds in music composition or the visual arts, this program provides professional-level training in a technologically sophisticated artistic environment. The 60-credit degree emphasizes developing creative skills in digital video, computer music, imaging, animation, interactive media, performance, and installation art.

Research Innovations and Initiatives

Arts department faculty members take varying approaches to the use of electronic media in artistic creation and performance. All are active artists whose works are represented internationally in museums, galleries, and performances.

Arts students are required to become familiar with creative tools in a variety of electronic media and are encouraged to work with combinations of media. The center of such creative work is the Integrated Electronic Arts at Rensselaer (iEAR) Studios, which include professional quality facilities in electronic and computer music, digital video production and post production, computer imaging and animation, interactive media, installation art, and performance art. In addition, qualified students in the M.F.A. program may use elective credits to explore Rensselaer's extensive technological resources. Numerous opportunities to engage in creative or research projects with students or faculty from other departments or schools within the Institute are also available.

Faculty*

Professors

Canier, C.—M.F.A. (Boston University); painting, drawing.

Century, M.—M.A. (University of California, Berkeley); musicology, music composition, improvisation and performance.

Goebel, J.—M.A. (Staaliche Hochschule für Music und Theater); music composition and performance.

Kagan, L.—M.A. (University at Albany, SUNY); studio arts.

* Departmental faculty listings are accurate as of the date generated for inclusion in this catalog. For the most up-to-date listing of faculty positions, including end-of-year promotions, please refer to the Faculty Roster section of this catalog, which is current as of the May 2004 Board of Trustees meeting.

Miller, B.—M.F.A. (New York University Graduate Film and Television Program); video art, media art.
Rolnick, N.—Ph.D. (University of California, Berkeley); music composition, electronic and computer music, electronic arts.

Distinguished Research Professor of Music

Oliveros, P.—Honorary Dr. of Music (University of Maryland, Baltimore County); music composition, electronic music, improvisation.

Associate Professors

Bahn, C.—Ph.D. (Princeton University); computer music and interactive performance.

High, K.—M.A.H. (SUNY-Buffalo, Center for Media Study); video, film, photography/production and theory.

Ruiz, K.—M.A. (New York University); interactive simulation, game studies, digital photography, and emerging multidisciplinary genres.

Staniszewski, M.—Ph.D. (Graduate School and University Center, City University of New York); art history and critical theory.

Assistant Professors

Bustamante, N.—M.F.A. (San Francisco Art Institute); new genres, performance art, video, installation.

Hahn, T.—Ph.D. (Wesleyan University); ethnomusicology, Japanese & contemporary music and dance, choreography.

Thornton, K.D.—M.F.A. (School of the Art Institute of Chicago); art and technology, installation/new media/sculpture.

Vamos, I.—M.F.A. (University of California at San Diego); video, film production and theory.

Clinical Professors

Gibson, D.—M.M. (Yale School of Music); music history and theory, orchestra performance, cello.

Shur, P.—Ph.D. (St. Petersburg Institute of Theatre, Music and Film); theatre.

Undergraduate Programs

At Rensselaer, the Department of the Arts offers bachelor's degree programs in Electronic Arts, Information Technology-Arts, and Electronic Media, Arts, and Communication (EMAC). Information and requirements specific to each program are described below.

Baccalaureate Programs

As explained in the Humanities and Social Sciences introduction, all baccalaureate students take 24 credit hours of core courses. The Institute also requires all students to complete a 24 credit hour math/science requirement. Required courses in mathematics and sciences are: MATH-1500 Calculus I for Humanities and Social Science, MATH-1620 Contemporary Ideas in Math, and CSCI-1100 Computer Science or CSCI-1010 Introduction to Computer Programming. MATH-1010 Calculus I and MATH-1020 Calculus II may be substituted for MATH-1500 and MATH-1620, respectively. To ensure depth in their science core, students must take at least two four-credit courses within a single area other than mathematics. One-credit courses that are graded satisfactory/unsatisfactory do not satisfy science requirements. For more information, see a departmental adviser.

Electronic Arts Curriculum

The B.S. degree in Electronic Arts allows students to pursue an arts degree that particularly emphasizes the use of technology and an interdisciplinary approach to electronic arts, including computer music, interactivity, video, computer imaging, animation, web, multimedia installation, and performance art. The degree is designed for students who aspire to be artists and are also strong in math, science, and technology.

The program prepares students for careers in which technology is used in producing works of art and music. It also prepares students for graduate studies in the electronic arts. The program integrates an intensive curriculum of studio and theory courses in electronic and traditional arts and music with Rensselaer's rigorous core requirements in math and science. Situated within the context of a technological university, Rensselaer's arts program offers a unique creative environment in which to develop and realize electronic art.

Rensselaer's location within a thriving community of technological innovation and proximity to art and cultural centers such as Williams College, Massachusetts Museum of Contemporary Art (MASS MoCA), Bard College, and Bennington College further strengthens its arts programs.

Applicants must submit a portfolio and written statement of interest. In this statement, an applicant should address his or her specific interests in the program, desire to work with electronic media, and a description of work submitted in the portfolio. The successful portfolio should include 10 to 20 examples of an applicant's best work in any medium, such as drawings, paintings, photographs, slides, CD-ROMS, video and audio recordings, music scores, and digital images.

Once accepted into the program, an undergraduate electronic arts student can expect to follow a program of courses similar to the following.

First Year

Fall		Credit hours	Spring		Credit hours
ARTS-1010	Media Studio: Video/Audio**	4	ARTS-1020	Media Studio/Imaging**	4
ARTS-1200	Basic Drawing	4	MATH-1620	Contemporary Ideas in Math	4
or				H&SS Elective	4
ARTS-2220	Fundamentals of 2-D Design	4	ARTS-1400	Music Fundamentals	4
IHSS-196x	Humanities Elective/ First Year Studies	4			
MATH-1500	Calc. I for H&SS	4			

Second Year

Fall		Credit hours	Spring		Credit hours
ARTS-2010	Intermediate Video*	4	ARTS-2020	Computer Music*	4
ARTS-2540	The Multimedia Century*	4	ARTS-2030	Net Art*	4
ARTS-2040	Intermediate Digital Imaging*	4		Math/Science Elective	4
CSCI-1100	Computer Science I	4		Humanities Elective	4
(or CSCI-1010)	Intro to Computer Programming)				

Third Year

Fall		Credit hours	Spring		Credit hours
	Professional History/Theory Elective	4	ARTS-4710	Technical Production and Documentation	4
	Professional Elective in Studio	4		Professional Elective in Studio	4
	Humanities/Social Science Elective	4		Social Science Elective	4
	Math/Science Elective	4		Math/Science Elective	4

Fourth Year

Fall		Credit hours	Spring		Credit hours
ARTS-xxxx	Senior Capstone	4	ARTS-xxxx	Senior Capstone	4
	Professional History/Theory Elective	4		Free Elective	4
	Humanities/Social Science Elective	4		Free Elective	4
	Free Elective	4			

* These courses may be taken in any order.

** These courses may be taken in reverse order.

Professional Electives in History/Theory

(eight credit hours required)

ARTS-2220	Fundamentals of 2-D Design
ARTS-2400	Music Theory I
ARTS-2500	History of Western Music
ARTS-2510	History of Jazz
ARTS-2560	The American Musical
ARTS-4100	Electronic Art Theory Seminar (various topics)
ARTS-4400	Music Theory II

Additional, appropriate History/Theory offering from other departments will be determined each semester.

Professional Electives in Studio

(eight credit hours required)

ARTS-2210	Sculpture I
ARTS-2600	Acting I
ARTS-4010	Interactive Arts Programming
ARTS-4020	Advanced Digital 3-D Projects
ARTS-4030	Virtual Environments/3-D Web
ARTS-4060	Animation I
ARTS-4070	Animation II
ARTS-4200	Advanced Drawing
ARTS-4210	Sculpture II
ARTS-4220	Painting
ARTS-4620	Theatre Performance
ARTS-496x	Performance Art

Information Technology—Arts Curriculum

The Information Technology degree with a concentration in Arts presents an exciting program of study that emphasizes the creativity of studio arts in shaping and influencing information technology. The courses in this program are supported by the Integrated Electronic Arts at Rensselaer (iEAR) studios, an extensive state-of-the-art facility dedicated to interdisciplinary research and artistic development in interactivity, digital video, computer imaging, digital audio, animation, virtual reality, web design, multimedia installation, and performance art. A series of courses is designed to give students hands-on experience with a full range of arts practice within Rensselaer's unique technological environment. Intermediate and advanced courses offer the opportunity to focus on a specialized research area and develop innovative collaborative projects. This study in the Arts concentration provides both the theoretical foundation and practical experience needed for the many fast-growing digital arts and media careers.

Electronic Media, Arts, and Communication (EMAC) Curriculum

This joint B.S. degree is earned from both the Department of the Arts and the Department of Language, Literature, and Communication. As such, it is interdisciplinary in nature and is therefore described in detail under the heading Interdisciplinary Programs and Research at the end of the Humanities and Social Sciences section of this catalog.

Minor Programs**Music**

A music minor consists of 16 credits from the music curriculum. All music minors must take ARTS-2400 Music Theory I. The remaining credits may be filled by courses in music history, theory, jazz, computer music, world music, and performance ensembles. Up to eight ensemble credits may be applied toward the music minor.

Studio Arts

A studio arts minor consists of 16 credits from the studio arts curriculum, which includes courses in drawing, painting, and sculpture. All studio arts minors must take at least three studio courses, and at least one of these must be at the 4000 level. The remaining four credits may be filled by another studio course or an art history course.

Electronic Arts

An electronic arts minor consists of 16 credits from the electronic arts curriculum. These should include at least one or two Media Studio courses (ARTS-1010 or ARTS-1020), one art history or theory course, and one or two 2000-level or 4000-level electronic arts studio courses.

Special Undergraduate Opportunities

Visiting Artists Series

The Department of the Arts supports the iEAR Presents! series which brings leading composers, performers, and media artists to campus for performances, exhibitions, lectures, and workshops. All students are encouraged to attend the rich variety of events both on campus and in the Troy area.

Ensembles

Many noncredit ensembles, dictated by student interest, are available on campus. Typical examples have included symphonic band, pep band, swing band, and vocal groups such as the Rensselyrics and the Rusty Pipes. The department offers one-credit ensembles that may be applied toward the music minor: Rensselaer Orchestra, Rensselaer Concert Choir, Jazz Ensemble, Percussion Ensemble, and Ghanaian Drumming Ensemble.

Graduate Programs

Master of Fine Arts in Electronic Arts

The M.F.A. program is designed for students pursuing artistic and academic careers emphasizing electronic media. Admission is highly competitive, and applicants must have completed a bachelor's degree and display a high level of ability in any artistic medium. In addition to the standard transcripts, recommendations, and statement of background and goals, prospective students submit a portfolio of creative work. The primary consideration in the selection process is evidence of talent and commitment to personal development as a creative artist.

The M.F.A. degree requires 60 credit hours of coursework at Rensselaer, including up to nine credit hours of master's thesis. Completion of the degree generally takes two years. Independent creative work done under a faculty mentor's supervision is encouraged. The form of this creative work may include musical compositions and performances, videotapes and installations, multimedia presentations, performance art, and computer-generated or mediated images. The student's work at Rensselaer culminates in a required thesis project, submission of written thesis document, and a thesis defense. The thesis project is a major artistic effort and may include a full-length performance, installation, or exhibition.

All students are expected to develop competency in using various media available in the iEAR Studios as well as in the theoretical and critical issues relevant to their fields of interest. Since the program is geared towards preparing students to participate actively in the art and music communities, practical aspects of production and presentation of creative work are emphasized.

The M.F.A. plan of study consists of 60 credit hours beyond the bachelor's degree¹, including:

- at least 30 credit hours in 6000-level courses
- three history or theory courses at the 4000 or 6000 level, one of which must be:²
ARTS-6110 Electronic Arts Overview
- a demonstration of competency in interdisciplinary electronic arts³
- four credits of artistic residency through Arts Practicum (ARTS-4050)
- enrollment in Electronic Arts Practice or Thesis every semester of residency⁴
- one to nine credits of Master's Thesis
- required public presentation and participation in critiques at the end of each semester

Course Descriptions

Courses related to all Arts curricula are described in the Course Descriptions section of this catalog under the department code ARTS.

¹ Individual requirements can be waived, in exceptional circumstances, by the department without decreasing the total number of credits for the degree. It is also possible to reduce the total number of credits required by transferring up to six credits of previous graduate work or by waiving up to 12 credits for professional experience, up to six credits of which can be graduate transfer credit.

² History/theory courses may be either four credits (4000-level courses) or 3 credits (6000-level courses).

³ Competency is demonstrated through two qualifying reviews. Each student will select two end-of-semester departmental critiques, which will be judged by the Electronic Arts Faculty Review Committee. The first review will identify the technical and creative areas to be addressed in the second review. The Committee must agree that the student's work shows competency and artistic merit in interdisciplinary media in order for the student to progress toward his or her final thesis by enrolling in Thesis supervision credits rather than Arts-6080.

⁴ All levels of Arts-6080 and Thesis supervision meet together in a weekly three hour seminar format, which is required of all students in residence. When enrolled for Thesis credits, students will also be expected to have regular individual meetings with their advisers. In their final two to three semesters of residency, students must enroll in a minimum of six thesis credits. The maximum number of thesis credits in which a student can enroll is nine.

Cognitive Science

Chair: Selmer Bringsjord

Director, Minds and Machines Program: Rensselaer's Undergraduate Program in Cognitive Science: Bram van Heuveln

Director, Graduate Program in Cognitive Science: Wayne D. Gray

Director, Undergraduate Advising, Philosophy: Michael J. Zenzen

Director, Undergraduate Advising, Psychology: Brett R. Fajen

Department Home Page <http://www.cogsci.rpi.edu>

Cognitive Science is broadly defined as the study of the mind/brain, how it is structured, how it functions, and how it can be represented and simulated. It is theoretically grounded in cognitive psychology, neuroscience, logic, and philosophy of knowledge and mind. Its practical applications include artificial intelligence, cognitive engineering and human factors, cognitive modeling, perception and action, and psychopharmacology.

At the graduate level, the department is committed to the concept of integrated cognitive systems. Specifically, research and teaching falls into areas that together cover low- to high-level cognition, whether in minds or machines:

- Reasoning (Human and Machine)
- Computational Cognitive Modeling
- Cognitive Engineering
- Perception and Action

Modern research facilities, including the CogWorks Laboratory, Interactive and Distance Education Assessment (IDEA) Laboratory, Rensselaer Artificial Intelligence and Reasoning Laboratory (RAIR Lab), Vision and Action Lab, and dedicated space in the Institute's new Social and Behavioral Research Laboratory, provide a new expression of the Department's interests in cognitive science that integrates the diverse research activities of the faculty in the Department. At the graduate level, our goal is to prepare our doctoral graduates for careers as researchers in four related areas within cognitive science: computational cognitive modeling, reasoning and decision-making, perception and action, and cognitive engineering.

Our new Ph.D. in Cognitive Science was approved by the State of New York in 2003. For information and guidance about applying to this new Ph.D., please contact Betty Osganian, Student Program Coordinator at the undergraduate and graduate levels at osgane@rpi.edu or Paul Bauer, Director of Graduate Enrollment Programs, Enrollment Management, Admissions, at bauerp@rpi.edu.

At the undergraduate level, the Department has maintained separate programs in philosophy and psychology leading to the Bachelor of Science degree in each discipline, respectively. An important goal of the undergraduate program, particularly for those enrolled in the Minds and Machines Program, the department's undergraduate program in cognitive science, is to prepare students for careers in the rapidly growing "Information Economy."

Research Innovations and Initiatives

Graduate training in Cognitive Science emphasizes research, modeling, and building of integrated cognitive systems. Within this broad scope the department has special strength in the following areas.

Human and Machine Reasoning

Foci include logic-based and knowledge-based AI, theorem-proving, and psychology of reasoning. The multi-disciplinary group of researchers involved is known as the Rensselaer Reasoning Group, which works out of the Rensselaer AI & Reasoning (RAIR) Lab. For information, contact Selmer Bringsjord via selmer@rpi.edu.

Computational Cognitive Modeling

Understanding an integrated cognitive system can be very complex. The possibilities for interaction among cognitive, perceptual, and action operations is astounding. The interplay of each of these with the other and with the external world cannot be simply predicted. Computational cognitive models provide a vehicle to manage this complexity with the goal of making progress towards understanding how integrated cognitive systems effect and are affected by their environment.

Cognitive Engineering

Cognitive Engineering is the application of cognitive science theories to human factors problems. Putting cognitive theories to the test of real-world applications is a means of maintaining a focus on the truly important cognitive issues. At Rensselaer, cognitive engineering has two components; (1) research directed at solving applied problems, and (2) research directed at developing engineering tools that others with less cognitive training can use to solve applied problems.

Perception and Action

This area of research focuses on perception with an emphasis on its role in the performance of both routine and skilled goal-directed action. Current research topics include visually guided locomotion in real and virtual environments, the coordination of eye and hand movements, and the integration of perception and action with higher-level cognition (e.g., learning and attention). At Rensselaer, these topics are investigated from various theoretical perspectives, including ecological psychology, dynamical systems theory, and computational cognitive modeling.

Faculty*

Professors

Baron, R.A.—Ph.D. (University of Iowa); industrial/organizational psychology, social psychology.

Bringsjord, S.—Ph.D. (Brown University); logic and artificial intelligence, foundations of artificial intelligence and cognitive science, computational creativity.

Gray, Wayne D.—Ph.D. (University of California at Berkeley); interactive behavior, computational cognitive modeling, cognitive science.

Koller, J.M.—Ph.D. (University of Hawaii); Asian and comparative thought, social philosophy, philosophy of religion.

Puka, W.J.—Ph.D. (Harvard University); ethics, cognitive-moral psychology, and applied cognitive science.

Rea, M.S.—Ph.D. (Ohio State University); visual psychophysics, lighting.

Reid, L.D.—Ph.D. (University of Utah); physiological psychology of reinforcement, drug and alcohol addiction.

* Departmental faculty listings are accurate as of the date generated for inclusion in this catalog. For the most up-to-date listing of faculty positions, including end-of-year promotions, please refer to the Faculty Roster section of this catalog, which is current as of the May 2004 Board of Trustees meeting.

Sun, Ron—Ph.D. (Brandeis University); computational cognitive modeling, cognitive architectures, skill learning, computational studies of consciousness, multi-agent interaction, connectionist and hybrid models.

Wallace, W.A.—Ph.D. (Rensselaer Polytechnic Institute); decision processes and cognition, decision support systems, improvisation, visualization and modeling.

Watt, J.—Ph.D. (University of Wisconsin-Madison); survey research via the internet; marketing communication; media and web cognitive processes; mathematical models of communication processes.

Zenzen, M.J., Jr.—Ph.D. (Rensselaer Polytechnic Institute); philosophy of science, philosophy of religion, aesthetics.

Associate Professors

Kalsher, M.J.—Ph.D. (Virginia Polytechnic Institute and State University); human factors, industrial/organizational psychology, applied experimental psychology.

Noble, R.G.—Ph.D. (University of California, Berkeley); psychobiology of choice and decision making.

Assistant Professors

Fajen, Brett R.—Ph.D. (University of Connecticut); visual perception, perception and action, ecological psychology, dynamical systems modeling; virtual reality.

Yang, Yingrui—Ph.D. (New York University); cognitive psychology, thinking, reasoning and decision-making, and cognitive science.

Research Assistant Professors

Schoelles, M.—Ph.D. (George Mason University); computational cognitive modeling, interactive behavior, natural language processing.

Clinical Assistant Professors

Fahey, J.T.—Ph.D. (University at Albany); philosophy of science, metaphysics, epistemology, philosophy of artificial intelligence.

Hubbell, C.L.—Ph.D. (University at Albany); behavioral neuroscience; psycho-pharmacology, learning.

Traver, H.—Ph.D. (University at Albany); affirmative action, interactive learning, sexual harassment, industrial/organizational psychology.

van Heuveln, Bram—Ph.D. (SUNY-Binghamton); philosophy of mind, artificial intelligence, logic, computation, reasoning, and cognition.

VerWys C.—Ph.D. (University at Albany); social psychology, forensic psychology.

Adjunct Faculty

Anderson, K.—Ph.D. (University of Georgia); counseling/clinical psychology.

Destefano, M.—M.S. (Rensselaer Polytechnic Institute); games design, psychology of play, system dynamics.

Thero, D.—Ph.D. (University at Albany); history of ideas, ethics, environmental philosophy, philosophy of biology.

Van Orman, K.—M.A. (Kent State University); ABD (SUNY-Albany); philosophy of science, philosophy of mind, philosophy of psychology, reasoning and cognition.

Undergraduate Programs

Baccalaureate Programs

Cognitive Science Program

The Cognitive Science Department's undergraduate program is the Minds and Machines program. See the "Minds and Machines program" in the Interdisciplinary Programs and Research section of this catalog.

Philosophy Curriculum

Philosophy is a search for understanding and wisdom through inquiry into fundamental questions of existence and reflection on the underlying assumptions of knowledge and action. Through inquiry and reflection, humans seek to answer the "big" questions: What is the nature of human consciousness or of reality or of human experience? What is the meaning of life? Of what does the good life consist? How are right and wrong determined?

Agreeing with Socrates that "the unexamined life is not worth living," the department encourages students to develop their own philosophical understanding, helping them to think critically and creatively about their own experience, values, and goals. This development of a coherent and critical personal perspective provides the foundation for a full and satisfying life, for the practice of responsible citizenship, and for leadership.

Whether working toward bachelor's degree in philosophy alone or toward a dual degree, students must complete at least 32 credit hours of work in philosophy. Each student will develop a plan of study in consultation with a departmental adviser. In their senior year, all philosophy majors must write a thesis. Preparing this thesis will give students some research experience and early training in thesis writing in the event that they pursue further study. Students will write the thesis under the guidance of a professor of their choosing or selected based on familiarity with the research topic.

Psychology Curriculum

The field of psychology uses scientific methods and procedures to study all aspects of behavior and cognitive processes. Knowledge acquired about such topics as motivation, perception, learning, memory, personality, and social interaction is of major practical value in many settings (e.g., industry, education, health care).

Through the applied focus of many of its course offerings, the department provides a wide range of practical skills and knowledge that are useful in many different employment settings. At the same time, all undergraduate psychology students are equally well prepared for graduate work.

The department's philosophy is to provide each student maximum flexibility in devising a specific plan of study. Psychology major requirements include the completion of three basic psychology courses (PSYC-1200 General Psychology, PSYC-2310 Experimental Methods and Statistics, and PSYC-4990 Undergraduate Thesis) and the completion of at least 18 additional credit hours within the department. The latter courses are electives and students will choose them in consultation with departmental advisers.

In addition, students must complete the basic degree requirements in physical, life, and mathematical sciences. Again, students will consult with their advisers in selecting specific courses to meet these requirements in accordance with their individual interests and goals.

As is evident in the typical four-year program outlined below, PSYC-1200 General Psychology is usually taken in the first year, PSYC-2310 Experimental Methods and Statistics and PSYC-4990 Undergraduate Thesis in the third or fourth year.

Due to the flexibility permitted in course selection, individual curricula may vary considerably within the framework of basic Institute degree requirements. Students are encouraged to supplement basic requirements in science and mathematics whenever feasible in order to take full advantage of Rensselaer's education opportunities. A minimum of 124 credit hours is required to complete this curriculum.

First Year Fall

	Credit hours
MATH-1500 Calculus I (Arch/H&SS)	4
or	
MATH-1010 Calculus I	
CSCI-1100 Computer Science I *	4
	[or 1st course of a science sequence]
IHSS-1964 First Year Studies	4
	Humanities Elective.....4

Spring

	Credit hours
MATH-1620 Contemporary Math Ideas in Soc.	4
or	
MATH-1020 Calculus II	
CSCI-1200 Computer Science II *	4
	[or 2nd course of a science sequence]
PSYC-1200 General Psychology.....	4
	Social Science Elective
	4

Second Year Fall

	Credit hours
Science or Math Elective	4
Psychology Elective.....	4
Humanities Elective (2000 level)	4
Free Elective	4

Spring

	Credit hours
Science or Math Elective	4
Psychology Elective.....	4
Social Sci. Elective (2000 level)	4
Free Elective	4

Third Year Fall

	Credit hours
PSYC-2310 Experimental Methods and Stats	4
	Psychology Elective.....4
	Hum. or Soc. Sci. Elective
	[same code 2000 level]
	Free Elective
	4

Spring

	Credit hours
PSYC-4990 Undergraduate Thesis.....	4
	Psychology Elective.....4
	Hum. or Soc. Sci. Elective
	[same code 4000 level]
	Free Elective
	4

Fourth Year Fall

	Credit hours
Psychology Elective.....	2
Free Elective	4
Free Elective	4
Free Elective	4

Spring

	Credit hours
Free Elective	4
Free Elective	4
Free Elective	4
Free Elective	2

*The science sequence may be selected, with the assistance of the student's adviser, from among 1000-level introductory sequences in biology, chemistry, computer science, geology, or physics, including EARTH-1030, EARTH- 1040. See the handout on the science core available from the School of Science.

Dual Majors

Dual majors are available in all three (cognitive science, philosophy, psychology) department curriculum areas. These options and their respective requirements are described below.

Cognitive Science

See the “Minds and Machines Program” in the Interdisciplinary Programs, and Research section.

Philosophy

Majors that may be combined with philosophy to form a dual major include computer science, physics, mathematics, biology, architecture, and various engineering majors (e.g., computer systems engineer). These dual programs serve the needs of those students desiring to combine the virtues of a liberal arts education with those of science, architecture, or engineering to achieve an education that is practical, stimulating, and diverse.

As an example of how such dual majors are structured, a student majoring in physics and philosophy would meet the requirements of the physics curriculum and take eight courses in philosophy. Among these would be PHIL-2130 Introduction to Philosophy of Science, PHIL-4360 Philosophical Problems of Space and Time, and PHIL-4310 Scientific Revolutions. A student majoring in computer science and philosophy would meet the requirements of the computer science curriculum and take eight philosophy courses including PHIL-2140 Introduction to Logic, PHIL-4260 Philosophy of Artificial Intelligence, and PHIL-4420 Computability and Logic. For a mathematics or computer science dual major, key courses in the philosophy major would be PHIL-4380 Philosophy of Mathematics, PHIL-4420 Computability and Logic, and PHIL-4720 Metaphysics.

Psychology

Dual majors with psychology may include computer science; electrical, computer, and systems engineering; and decisions science and engineering systems. A dual major in management and psychology is also available. The Lally School of Management has established certain requirements that must be completed for this major in addition to those described above. For further information and a list of requirements for this dual major, see the *Lally School of Management* section of this catalog.

Minor Programs

The Department of Cognitive Science provides a variety of minor programs within its curricula. Each of these is described in detail below.

Philosophy

To complete the minor in philosophy, a student chooses a minimum of four philosophy courses, at least one of which must be at the 4000 level.

Philosophy of Science and Logic

This minor focuses on the underlying assumptions, conceptual structures, and implications of mathematical and scientific knowledge. To complete this minor, a student chooses a minimum of at least four philosophy courses, three of which must be from the following list:

PHIL-2130 Introduction to Philosophy of Science

PHIL-2140 Introduction to Logic

PHIL-4260 Philosophy of Artificial Intelligence

PHIL-4360 Philosophical Problems of Space and Time

PHIL-4380 Philosophy of Mathematics

PHIL-4420 Computability and Logic

PHIL-4440 Theory of Knowledge

PHIL-4720 Metaphysics

Philosophy of Human Values and Society

This minor emphasizes values in contemporary society. Human values in a technological society are explored through inquiries into the nature and function of art, morality, religion, and social institutions. To complete this minor, a student chooses a minimum of five philosophy courses, at least three of them from the following list:

PHIL-2300 Asian Philosophies

PHIL-2500 Bioethics

PHIL-2830 Comparative Religion

PHIL-4240 Ethics

PHIL-4300 Environmental Philosophy

PHIL-4520 Existentialism

PHIL-4570 Buddhism

Psychology

To complete the minor in psychology, a student chooses a minimum of four psychology courses, with at least one at the 4000 level.

Brain and Behavior

This minor focuses on understanding how the structure, physiology, and chemistry of the brain shape human behavior and the practical implications of this understanding for medicine, psychology, and biotechnology. PSYC-1200 General Psychology is a prerequisite for this minor, and PSYC-4320 Psychobiology is required for completion of the minor. The remaining two courses should be chosen from the following ten:

PSYC-2940 Readings in Brain and Behavior

PSYC-4110 Motivation and Performance

PSYC-4410 Sensation and Perception

PSYC-4450 Learning

PSYC-4500 Drugs, Society, and Behavior

PSYC-2960 Topics in Brain and Behavior

PSYC-4600 Cognition and the Brain

PSYC-4940 Readings in Brain and Behavior

PSYC-4960 Topics in Brain and Behavior

Community and Health Psychology

This minor covers the applications of psychology in developing the understanding people need to exert a constructive control over their own behavior and their interactions in real-world social situations. PSYC-1200 General Psychology is a prerequisite, and PSYC-4720 Abnormal Psychology is a requirement for this minor. An additional two courses should be chosen from the following:

PSYC-2730 Social Psychology

PSYC-2940 Readings in Community and Health

Psychology

PSYC-2960 Topics in Community and Health

Psychology

PSYC-4110 Motivation and Performance

PSYC-4340 Human Sexuality

PSYC-4440 Personality

PSYC-4500 Drugs, Society, and Behavior

PSYC-4630 Aids: Paradise Lost

PSYC-4770 Psychopharmacology and Behavior

Toxicology

PSYC-4940 Readings in Community and Health

Psychology

PSYC-4960 Topics in Community and Health

Psychology.

Human Factors

This minor focuses on applying basic psychological principles to the interaction between person and machine. As technology becomes more sophisticated, it is critical to design equipment that optimally fits the needs and abilities of users. The prerequisite for this course is PSYC-1200 General Psychology and PSYC-2220 Human Factors in Design is required. The remaining two courses to complete the minor should be selected from the following:

PSYC-4160 Human Factors Seminar

PSYC-4180 Selected Topics in Engineering Psychology

PSYC-4280 Human-Computer Interaction

PSYC-2940 Readings in Human Factors

PSYC-4940 Readings in Human Factors

PSYC-4370 Cognitive Psychology

PSYC-2960 Topics in Human Factors

PSYC-4960 Topics in Human Factors

Industrial/Organizational Psychology

This minor focuses on applying psychology to performance in the work place. It helps individuals develop the knowledge base needed to improve the performance of themselves and others in the work place. PSYC-1200 General Psychology is a prerequisite for this minor and PSYC-4200 Industrial/Organizational Psychology is a requirement. An additional two courses should be chosen from the following:

PSYC-2730 Social Psychology	Psychology
PSYC-4110 Motivation and Performance	PSYC-4940 Readings in Industrial/Organizational Psychology
PSYC-2940 Readings in Industrial/Organizational Psychology	PSYC-4960 Topics in Industrial/Organizational Psychology
PSYC-2960 Topics in Industrial/Organizational Psychology	

Perception and Action

By considering the personal and situational factors influencing social behavior, individuals choosing this minor develop techniques to enhance their social perception, decision making, group influences on behavior, and attitudes. PSYC-4410 Sensation and Perception is a prerequisite, and PSYC-4420 Perception in Action is required. Two additional courses should be selected from the following:

PSYC-2600 Moral Development	PSYC-4720 Abnormal Psychology
PSYC-2940 Readings in Social Psychology	PSYC-4400 Personality
PSYC-2960 Topics in Social Psychology	PSYC-4340 Human Sexuality
PSYC-4940 Readings in Social Psychology	PSYC-4630 Aids: Paradise Lost
PSYC-4960 Topics in Social Psychology	

Graduate Programs

Master's Programs

The Cognitive Science Department offers a Master of Science degree in Cognitive Science. The degree is open only to two groups of students. The first group is those who are already admitted to Rensselaer in a doctoral program. This includes students in the Cognitive Science doctoral program as well as students in other doctoral programs (e.g., Decision Sciences and Engineering Systems, Computer Science, and so on). Rensselaer doctoral students who desire a Masters in Cognitive Science should contact the department directly. The other group able to obtain a Master of Science degree in Cognitive Science is those in our five-year program that combines the Bachelor of Science in Psychology or Philosophy with the Cognitive Science masters. See "Special Undergraduate Opportunities" for more information.

Accelerated Programs

Qualified students, in consultation with an academic adviser, may design a five-year program to complete requirements for the Bachelor of Science in Psychology or Philosophy and the Master of Science in Cognitive Science. An additional 30 credit hours are required beyond the B.S. degree. Students must apply to the program prior to or early in the first semester of their junior year. This is a research-oriented, Cognitive Science program that will emphasize one of the four areas (Human and Machine Reasoning, Computational Cognitive Modeling, Cognitive Engineering, or Perception and Action) that constitutes our approach to integrated cognitive systems. Prior to applying, we expect that students will have taken introductory courses in cognitive psychology, philosophy of mind, and cognitive science, as well as being involved in one of the several research laboratories sponsored by department faculty.

Doctoral Program

The new Ph.D. in Cognitive Science was approved by the State of New York in 2003. For information and guidance about applying to this new Ph.D. program, please contact Betty Osganian, Student Program Coordinator at the undergraduate and graduate levels at osgane@rpi.edu or Paul Bauer, Director of Graduate Enrollment Programs, Enrollment Management, Admissions, at bauerp@rpi.edu.

Course Descriptions

Undergraduate courses in Philosophy or Psychology are described under those headings of this catalog under the department codes PHIL and PSYC. Graduate courses in Cognitive Science are described in the Course Descriptions section under COGS.

Economics

Chair: Donald Siegel

Director, Ph.D. Program in Ecological Economics: David Stern

Department Home Page: <http://www.rpi.edu/dept/economics>

The Nobel Prize in Economic Science recognizes the rigor and analytical content of economics. The private sector also values economic analysis, and economists are widely sought as potential employees by leading financial institutions and consulting firms. At Rensselaer, undergraduate students are introduced to the key ideas of economics that revolve around scarcity of resources and the function of social institutions. They learn to make choices among alternatives in which it often is not possible to achieve all desirable outcomes.

Through a sequence of progressively more advanced courses, students learn the concepts and tools of economics as applied to a variety of public policy issues such as: growth and technological change, resource scarcity and environmental pollution, unemployment, inflation, poverty, government spending and taxation, and regulation. Primary emphasis is on the analysis of how markets perform the central economic task of allocating scarce resources among competing ends. However, several courses such as public finance, government regulation, and cost-benefit analysis focus on public-sector allocative decision making. For engineers, scientists, and managers, career choices and options are often heavily intermixed with economic problems and policies.

The basic one-term course, ECON-1200 Introductory Economics, creates an awareness of the country's economic problems and furnishes the basic tools with which, as voting citizens, students will reach independent, rational judgments on public policy questions.

The course provides a general introduction to economic principles and institutions. It is a self-contained course and is also a prerequisite for other courses listed. However, under certain circumstances, this prerequisite may be waived.

Prospective students should also be aware that the department administers the Edward J. Holstein Memorial Award for Excellence in Economics and the Shavell-Weinman Fund. Faculty Members are also encouraged to work with undergraduates on research projects.

Research Innovations and Initiatives

At the graduate level, the training objective is to allow students to apply the body of economics knowledge and techniques to a variety of issues in academic, government, and business settings. Department faculty and students focus their research in selected areas, including environmental and ecological economics, economics of technological change, productivity analysis, cost-benefit analysis, economic regulation, and international competitiveness.

Faculty*

Professors

Adams, J.—Ph.D. (University of Chicago); growth and technical change, labor, public economics.

Duchin, F.—Ph.D. (Berkeley); input-output analysis, structural economics, ecological economics, economic development, technological change.

Gowdy, J.M.—Ph.D. (West Virginia University); ecological economics, industrial organization and public regulation, regional economics.

Siegel, D.S.—Ph.D. (Columbia University); economics of technological change, productivity analysis, university technology transfer, corporate social responsibility.

Vitaliano, D.F.—Ph.D. (City University of New York); public finance, cost-benefit analysis, health economics.

Associate Professor

Stern, D.—Ph.D. (Boston University); natural resource economics, quantitative methods, ecological economics.

Assistant Professor

Simons, K.—Ph.D. (Carnegie Mellon University); industrial organization and technical change, dynamics of economic systems.

Clinical Associate Professor

Heim, J.—Ph.D. (State University of New York at Albany); money and banking, international economics.

Clinical Assistant Professor

Jones, R.—Ph.D. (Rensselaer Polytechnic Institute); money and banking, introductory economics, econometrics.

Emeritus Faculty

Hohenberg, P.M.—Ph.D. (Massachusetts Institute of Technology); economic history, economics of technological change.

Undergraduate Programs

Rensselaer's undergraduate major in economics differs from other programs in three important respects. First, it requires that about one-fourth of the student's program be in mathematics and the natural sciences. Second, students must apply quantitative tools to real economic problems, notably in problem labs that employ regression, linear programming, and risk analysis. Finally, in addition to dedicated courses, students pursue various courses dealing with relevant aspects of environmental, ecological economics, and the economics of technological change.

* Departmental faculty listings are accurate as of the date generated for inclusion in this catalog. For the most up-to-date listing of faculty positions, including end-of-year promotions, please refer to the Faculty Roster section of this catalog, which is current as of the May 2004 Board of Trustees meeting.

Baccalaureate Programs

A major in economics requires 34 credit hours and must include the following: ECON-1200 Introductory Economics, ECON-2010 Managerial Economics, ECON-2020 Intermediate Macroeconomics or ECON-4130 Money and Banking, ECON-4570 Introduction to Econometrics or ECON-4120 Quantitative Analysis, and ECON-4900 Seminar in Economics. An approved course in Statistics is a prerequisite to the Quantitative Analysis and Econometrics requirement.

Although specific courses will vary, the template below illustrates a typical bachelor of science curriculum within the Department of Economics. This curriculum requires a minimum of 124 credit hours.

First Year

Fall		Credit hours	Spring		Credit hours
MATH-1500	Calculus I ²	4	MATH-1520	Math. Methods in Management and Economics ⁴	4
	Science Option I ¹	4	ECON-1200	Introductory Economics.....	4
	First Year Studies	4		Science Option II ¹	4
	Hum. or Soc. Sci. Elective	4		Hum. or Soc. Sci. Elective	4

Second Year

Fall		Credit hours	Spring		Credit hours
ECON-2010	Managerial Economics.....	4	ECON-2020	Intermediate Macroeconomics	4
	Statistics Option	4		Economics Elective	4
	Hum. or Soc. Sci. Elective	4		Computer Science Elective	4
	Elective.....	4		Statistics Option or Elective	4

Third Year

Fall		Credit hours	Spring		Credit hours
ECON-4120	Quantitative Analysis.....	4	ECON-4570	Econometrics	4
	Hum. or Soc. Sci. Elective	4		Economics Elective.....	4
	Elective.....	4		Hum. or Soc. Sci. Elective	4
	Elective.....	4		Elective.....	4

Fourth Year

Fall		Credit hours	Spring		Credit hours
	Economics Elective.....	4	ECON-4900	Seminar in Economics	2
	Hum. or Soc. Sci. Elective	4		Economics Elective ³	4
	Electives	8		Hum. or Soc. Sci. Electives ³	6 ⁵

¹ Science options are CHEM-1100, CHEM-1200; PHYS-1100, PHYS-1200, ERTH-1030, ERTH-1040. Other sequences may be substituted with approval.

² This is a special section of this course for H&SS students, MATH-1010 may be substituted for MATH- 1500.

³ As required.

⁴ Special version of this course for H&SS majors.

⁵ Degree completion may require more credits.

Concentrations

Work in the major field can easily be combined with meaningful concentrations of study in other fields of interest. Some possibilities include:

- Emphasizing liberal electives in, for example, a prelaw program or policy studies related to science and technology;
- Pursuing a minor concentration of 15 to 18 credit hours in a related professional field, such as environmental or transportation engineering, management, or computer science.

Dual Major Programs

Students are encouraged to consider a dual major as a means of enhancing their employment and graduate school prospects. Training in economics can provide an edge in either situation. A dual major is NOT a double degree, which requires 30 additional credits beyond the first degree. Dual majors may use their economics courses to fulfill the social science portion of the 24-credit H&SS Core. Otherwise the requirements are the same as for the single major in economics.

The department also offers two specially designed dual major options that uniquely combine economics with programs emphasizing science and technology and environmental issues. These include Ecological Economics, Values, and Policy and Environmental Studies, which, as programs that cross disciplines or even schools, are included in the School's Interdisciplinary Programs and Research section found at the end of the H&SS portion of the catalog.

Minor Programs

At least 16 credit hours are required to complete an economics minor. These must include ECON-1200 Introductory Economics and ECON-2010 Managerial Economics. All courses must be taken for a grade to count towards the minor (or major). For further information on minors in economics, contact Donald Vitaliano, Sage 3405, vitald@rpi.edu, ext. 8093 or John Heim, Sage 3410, heimj@rpi.edu, ext. 8096.

Special Undergraduate Opportunities

Accelerated Programs

In consultation with an academic adviser, a student may design a five-year program to complete requirements for the Bachelor of Science in Economics and the Master of Science in Operations Research and Statistics or the Master of Business Administration. Participation in these programs may require admission to the Office of Graduate Education. They are designed to prepare the student for employment or for advanced graduate or professional training.

Graduate Programs

The Department of Economics offers a Master of Science degree aimed at developing skills in economic analysis and an interdisciplinary Ph.D. in Ecological Economics. These programs stress important applications in industry, government, and education.

Graduate level research projects cover a wide range of economic issues, including energy and environment; technological change and productivity measurement, cost-benefit analysis, health economics, international competitiveness, community sustainable development, the role of technology as an agent of change in the structure of national output in planned and market economies, global economic cooperation, cost-benefit analysis of state and local projects and policies, urbanization and industrial development; the economics of new technologies in nonprofit hospitals, technological change in input-output analysis, and innovation and international trade.

Master's Programs

Though students must become competent in certain fundamental areas such as economic theory and econometrics, programs in economics are quite flexible and can readily accommodate those wishing to combine a graduate-level major in economics with a minor concentration in some related area. An economics minor can also be developed to complement a graduate program in another discipline.

Master of Science

Applicants for the M.S. in Economics program should have completed a bachelor's program at an approved institution with basic undergraduate courses in economics and mathematics, including calculus. Some background in statistics is strongly recommended. Candidates must complete 24 credit hours of course work selected in consultation with the program adviser, submit a six-credit thesis, and pass a comprehensive oral examination. There is no foreign language requirement.

Professional Masters Program in Ecological Economics, Values, and Policy

The Departments of Economics and Science and Technology Studies (STS) jointly offer this program, which builds on Rensselaer's nationally recognized expertise and course offerings in the economic, political, social, cultural, and ethical implications and interactions of science, technology, environment, and society. EEVP targets early and mid-career professionals in state and local government, secondary education, business, and the nonprofit sector; for example, professionals in environmental NGOs (non-government organizations) who wish to upgrade their skills and advance their careers. Building on required courses in environmental, ecological, and natural resource economics and in environmental philosophy and policy, EEVP helps students acquire skills such as policy analysis and ecological valuation. These skills are necessary to address the complex multidisciplinary problems any society faces in such areas as environment and health, appropriate technology, and sustainable development. The 21st century promises a continuation of the march toward globalization. Dealing with prospects and problems of a world economy and the growing human impact on the natural world requires a broad and deep education. EEVP offers "hands-on" training that puts into practice the slogan "think globally, act locally."

For more detailed information on the EEVP Master's Program, see the Interdisciplinary Programs and Research section of this catalog.

Doctoral Programs

The Economics Department offers an interdisciplinary Ph.D. degree in ecological economics with cooperation from the Departments of Science and Technology Studies, Biology, and the Environmental Management and Policy Program in the School of Management.

This Ph.D. program allows for individual research specialization and independent study in an atmosphere of close contact between faculty and students based on research participation. Ecological economics is an interdisciplinary field involving economics, ecology, and social theory. Students take basic theory courses in micro- and macroeconomics and econometrics, as well as course sequences in the advanced fields of ecological economics and public sector economics. Beyond the required work in theory and quantitative methods, students can choose an elective field for advanced study and dissertation research. Students may choose other advanced courses from offerings within the Departments of Biology, Science and Technology Studies, and other Rensselaer departments that meet students' interests.

The Ph.D. in economics requires 90 hours beyond the baccalaureate degree and 60 hours beyond an M.A. or M.S. in economics or a related field. This requirement entails a minimum of 30 hours of course work or 10 three-credit courses. However, most students will choose to take more courses and may be required to do so if their background so indicates. Thesis credit will vary between 15 and 30 hours.

Students must complete core courses in microeconomics, macroeconomics, and quantitative methods. In addition, two of the following three courses are required: ECON-6230 Environmental Economics, ECON-6250 Ecological Economics, and ECON-6240 Natural Resource Economics. The rest of the program is chosen around other advanced courses in economics, biology, environmental management, philosophy, science and technology studies, or environmental engineering. Students are also encouraged to attend seminars conducted regularly in the economics department as well as in other Rensselaer departments, e.g., science and technology studies and biology.

Immediately upon entering the economics Ph.D. program, students should draft a study plan. These plans must be kept current, as they will likely undergo periodic changes. The program director or co-director must approve the plan of study.

Economics Ph.D. students must also pass written qualifying exams that cover theory and application in the three required core fields. Exams are offered twice a year. The examining faculty will prepare study questions and a list of related readings for students planning to take the required exams in microeconomics, macroeconomics, and quantitative methods.

Upon successfully completing the qualifying exams, students organize a thesis committee for their dissertations. One member of the required four-person committee must be from outside the economics department. The student will prepare a dissertation prospectus that covers the theoretical and applied literature in the chosen field of study for the dissertation and outline the planned dissertation research. The prospectus presentation constitutes an additional oral field exam in a chosen area of specialization.

Course Descriptions

Courses related to all economics curricula are described in the Course Descriptions section of this catalog under the department code ECON.

Language, Literature, and Communication

Chair: James H. Watt

Department Home Page: <http://www.llc.rpi.edu/>

The Department of Language, Literature, and Communication (LL&C) is an internationally-recognized center for interdisciplinary education, research, and theory development. The department's programs span areas including Human-Computer Interaction (HCI), composition and writing, computer-mediated communication (CMC), foreign languages, graphics and visual communication, literature and cultural studies, rhetoric, and technical communication.

The department offers a B.S. in Communication, including concentrations in Web Design and Analysis (Web D&A) and Graphic Design; M.S. programs in Technical Communication, including a concentration in Human-Computer Interaction, and in Communication and Rhetoric, and a Ph.D. in Communication and Rhetoric. Also offered in partnership with the Department of the Arts is a B.S. in Electronic Media, Arts, and Communication (EMAC). Through another partnership with the Faculty of Information Technology, LL&C offers a B.S. in Information Technology (IT) with Communication as a concentration. The M.S. program in Technical Communication is available through Rensselaer's distance education program as well as on campus.

The B.S. programs prepare students for advanced study or for employment in fields related to communication technology, strategic communication, technical communication, multimedia production, and careers in the emerging Internet technologies. The M.S. degrees can lead to careers as information

architects, Web-designers, multimedia specialists, graphic designers, electronic communication specialists, technical communicators, usability engineers, and instructional interface designers. The M.S. programs also provide a foundation for doctoral study. Ph.D. graduates in Communication and Rhetoric find careers in business and government as well as in academia. The growing need for persons who understand the new communication technologies, and their impact on society and individuals, creates a demand for all LL&C program graduates.

Undergraduates may use some of their elective courses to complete a Certificate in Communication Design. Certificate programs in either Graphics or HCI are available to graduate students. Graphics or Communication Design can provide special competency in Visual Design and Communication. The HCI certificate provides special competency in the design and analysis of computer-user interfaces. Either graduate certificate program can be incorporated into a standard M.S. program plan of study. The program in HCI is available via distance education and is an option in the M.S. in Management and Technology as well as in the M.S. in Technical Communication.

Research Innovations and Initiatives

In research, the department's mission is to develop and assess new understandings of how people create and manage their social and professional worlds through the mediation of symbol systems and communication technologies. The major thrusts of department research are described below.

Communication and Computers

Research in this area focuses on technology-mediated communication, design of human-computer interactions, information technologies in community development and networking, and technical and professional communication practices.

Rhetoric, Culture, and Communication Technology

Specific research projects in this area include cultural studies of film, photography, advertising, and cyberspace; the history and theory of rhetoric; and language in collaborative design work. Also underway is research in cultural rhetoric, which includes ethnographic studies of themed cultural environments.

Media Design and Theory

Design of hypermedia text and artwork, writing for print and digital media, visual communication and design, and the integration of visual with verbal codes are current areas of research in this category.

Research Facilities

To support these programs, LL&C maintains a variety of research-centered laboratories and facilities:

- **Human-Computer Interaction Laboratory**-Situated in 4303 Sage Lab, the HCI Laboratory fosters interdisciplinary research and development. Ongoing projects include usability research, online support of physical performance, technological support for collaborative work, and community networking. The laboratory is equipped with computer workstations and video equipment for recording and analyzing human-computer interactions.
- **LL&C Conference Circle**-Located in 4305 Sage Lab, this technology-supported conference room is available by reservation to department students, faculty, and staff. Developed with funding from the National Science Foundation, NYNEX, and Intel, the Conference Circle provides three Pentium workstations linked to each other and to the campus network. Large screen monitors buried in the Conference Circle surface allow groups to view, discuss, and alter common work.
- **Design Conference Room**-Located in the basement level of the Folsom Library, this conference room facility integrates electronic and face-to-face interaction. Funded by the National Science Foundation, the Design Conference Room provides support for intellectual teamwork through individual private

systems networked to a common public system. Reconfigurable Collaboration Network© software permits participants to take turns controlling sessions on the public system, working together on common projects. The Design Conference Room is available to department faculty and student teams by reservation. For more information about the DCR access <http://www.dcr.rpi.edu>.

- Intel Laboratory-Students in LL&C and in the EMAC program have access to the Intel Lab in 4711 Sage Lab for both classes and individual work. The laboratory contains Pentium workstations with expanded memory and a variety of peripherals, all connected to the campus network via Ethernet. Large format printers, scanners, and digital cameras are also available. The laboratory also offers software packages from Adobe, Macromedia, and Microsoft. Additional software includes Cosmo Worlds, Extreme 3-D, SoftImage, QuarkXPress, RoboHelp, Chinese Word Processing, and a variety of browsers. More information on the Intel Lab is available by calling ext. 6467.
- Writing Center-This tutorial service available to all Rensselaer students offers help in all areas of writing such as lab reports, research projects, papers, proposals, reports, formal letters, and resumes. Students receive instruction from expert staff on a one-to-one basis. Attendance is voluntary, and no appointment is necessary. Students can also arrange more formal programs of writing improvement. Hours are posted at the center in 4508 Sage Lab. Additional information about the center's resources (including on-line publications) can be accessed on its web site at <http://www.rpi.edu/web/writingcenter/>.
- Collaborative Classroom-Drawing on previous work in the Rensselaer Design Conference Room, the Collaborative Classroom, funded by the National Science Foundation and NYNEX and located in 2015 Troy Building, supports intellectual teamwork in the classroom. It provides teams of laptop users with the technological support required to generate, coordinate, and refine the joint action required in collaborative design. Furnished with technology-enhanced conference tables, the Collaborative Classroom provides across-the-table seating for seven teams of six students each.
- Social and Behavioral Research Laboratory (SBRL)-The SBRL contains space and equipment for applied and basic research in computer-mediated communication (CMC), human-computer interaction (HCI), psychology, cognitive science, community informatics, and technology studies. Faculty and graduate students from the Departments of Language, Literature, and Communication; Cognitive Science; Computer Science; Electronic Arts; Management; and Science and Technology Studies conduct multi-disciplinary studies in the social and behavioral impact of information technologies. The 8,500 square foot lab contains HCI and human factors research suites with eye tracking and observational video systems, focus group rooms with both direct and video observation and recording facilities, small CMC research rooms with computer and video systems, an immersive virtual reality studio, a computer-aided telephone and Web survey research lab, and a large-group research room. The SBRL is located in the newly renovated Gurley Building, which is listed in the National Registry of Historic Buildings, in downtown Troy adjacent to the Rensselaer campus.

Faculty*

Professors

- Geisler, C.**—Ph.D. (Carnegie-Mellon University); writing in workplace and professional contexts; the intersection of text, technology, and design; methods of the analysis of verbal data; genre theory; academic literacy.
- Krull, R.**—Ph.D. (University of Wisconsin-Madison); electronic user interfaces and performance support; training and documentation for physical skills; usability research design.

*Departmental faculty listings are accurate as of the date generated for inclusion in this catalog. For the most up-to-date listing of faculty positions, including end-of-year promotions, please refer to the Faculty Roster section of this catalog, which is current as of the May 2004 Board of Trustees meeting.

- Nadel, A.**—Ph.D. (Rutgers University); literary theory and cultural narrative; American cultural studies; film and television studies; African-American studies; modern and contemporary American literature; creative writing.
- Odell, C. L.**—Ph.D. (University of Michigan); composition theory and research; integrating visual and verbal information; writing in nonacademic settings; writing in engineering; rethinking “literacy”; education reform.
- Search, P.**—M.A. (Goddard College); visual design theory and practice; computer-generated imagery and graphics; computer animation and hypermedia; user interface design for hypermedia programs.
- Watt, J.**—Ph.D. (University of Wisconsin-Madison); survey research via the Internet; marketing communication; media and web cognitive processes; web communication technologies; mathematical models of communication processes.
- Whitburn, M.**—Ph.D. (University of Iowa); history and teaching of technical communication; history of rhetoric, rhetoric bibliography; history of English studies; web design.

Associate Professors

- Bennett, A.**—M.F.A. (Yale University); graphic design theory, research, and practice: facilitation of user input in the design process through the creation of innovative and interactive graphic art prints, pedagogical tools, and research-generated or commissioned communication objects.
- Deery, J.**—D.Phil. (Oxford University); media studies; television and new media; advertising and culture; popular culture; utopian literature; literature and science.
- Esrock, E. J.**—Ph.D. (New York University); cognitive/neuropsychological approaches to literature and art; theory of literature, art, and photography; modern literature; women writers.
- Gordon, T.**—Ph.D. (University of California-Berkeley); cultural anthropology; religion and globalization; ethnographic methods; themed environments; documentary film.
- Zappen, J. P.**—Ph.D. (University of Missouri); digital rhetoric; activity theory; community networking; participatory-design processes; web-design theory and research.

Clinical Associate Professors

- Grice, R.**—Ph.D. (Rensselaer Polytechnic Institute); information usability; human-computer interaction; communicating on the WWW; usability testing and evaluation; analysis of computer-games interfaces; effective teaching and learning in the virtual classroom.

Assistant Professors

- Choi, J.**—Ph.D. (SUNY at Buffalo); social uses of the Internet; global telecommunication systems; digital media production & policies; intercultural communication; social network analysis.
- Hart-Davidson, W.**—Ph.D. (Purdue University); intersections of human-computer interaction (HCI) and technical communication; XML and semi-structured data modeling; usability and participatory design; rhetorical theory.
- Hübscher-Younger, T.**—Ph.D. (Auburn University); computer-supported collaborative learning; educational technology; human-computer interaction; usability evaluation; software engineering; web application and interface design and development.

Clinical Assistant Professors

- Gerber, L. R.**—Ph.D. (University at Albany); scientific French; electronic media; computer-mediated communication in France: the concurrent development of the Minitel and Internet in France and the Francophone countries.
- Gutmann, J.**—D.A. (University at Albany); creative writing (poetry and poetics); myth and language; environmental ethics and literature; Native American literature; Asian philosophies and religions; world religions.
- Miyamoto, P.**—M.F.A. (Otis Art Institute); visual design theory; publication design theory and practice; exploration of paint-based medium as an expressive art form.

Lecturers

Dubrawski, M.—M.A. (San Francisco State University): Japanese pedagogy; instructional technology; computer-assisted language learning.

Lynch, M.—M.A. (Univ. of Connecticut); human-computer interaction; analysis of computer game interfaces; design of AI within computer games in support of social interaction and communication; cognitive processes for modeling computer game AI; speech act theory.

Marko, M.—M.A. (University of Oregon); German language pedagogy, Internet in German-speaking Europe, Green movement, literature and the arts, film studies, 20th century German literature and culture, Romanticism.

Shen, T.—M.A. (Chinese Academy of Social Sciences); M.A. (University of Massachusetts-Amherst); Chinese linguistics, dialectology, phonology, and general linguistics.

Undergraduate Programs

All LL&C undergraduate programs provide students with the multidisciplinary education essential for leadership in an “information society.” Rapidly transforming this society are new communication processes and technologies. Building on Rensselaer’s strong technological infrastructure, these programs offer hands-on education in the new communication technologies and theoretical frameworks to understand and shape the cultural impact of these technologies.

Baccalaureate Programs

Communication (Comm) Curriculum

The B.S. in Communication requires a total of 124 credit hours, including 44 credit hours of major requirements. Of the remaining credit hours, 32 are free electives, 24 meet Rensselaer requirements in the humanities and social sciences, and 24 are taken in math, science, and computing.

B.S. in General Communication

First Year

Fall	Credit hours	Spring	Credit hours	
IHSS-1966 /COMM-1510 Introduction to Communication Theory	4	LITR-2110 Introduction to Literature	4	
WRIT-2110 Rhetoric and Writing	4	COMM-2610 Introduction to Visual Communication.....	4	
MATH-1500 Calc. I for H&SS	4		Hum. Elective/First-Year Studies	4
IHSS-1969 /COMM-196X Communication and Information	4	MATH-1620 Contemp. Math Ideas in Society.....	4	

Second Year

Fall	Credit hours	Spring	Credit hours
Major Requirement ¹	4	Major Requirement ¹	4
Social Science Elective	4	Hum./Soc. Sci. Elective	4
Math/Science Elective	4	Math/Science Elective	4
Free Elective	4	Free Elective	4

¹ Major Requirement (44 credit hours required) All Communication majors are required to take IHSS-196x or COMM-1510, COMM-2610, and IHSS-196x or COMM-196X (Comm. and Info. Tech.) Students who are following the General Communications major (i.e., those who are not following the Web Design and Analysis or the Graphic Design Concentrations) are also required to take LITR-2110 and WRIT-2110. The remaining 24 credit hours are comprised of courses taken from the Language, Literature, and Communication Department. Courses with the codes COMM, LANG, LITR, and WRIT fulfill the requirement.

Third Year**Fall**

	Credit hours
Major Requirement ¹	4
Hum./Soc. Sci. Elective	4
Math/Science Elective	4
Free Elective	4

Spring

	Credit hours
Major Requirement ¹	4
Social Science Elective	4
Math/Science Elective	4
Free Elective	4

Fourth Year**Fall**

	Credit hours
Major Requirement ¹	4
Hum./Soc. Sci. Elective	4
Free Elective	4
Free Elective	4

Spring

	Credit hours
Major Requirement ¹	4
Free Elective	4
Free Elective	4

Concentration

All communication undergraduates may choose a more specialized track or concentration, in order to fulfill a bachelor's degree. The Web Design and Analysis (Web D & A) concentration provides a curriculum for students who want to understand how communication principles affect the design and effectiveness of the World Wide Web and related systems. The concentration prepares students to provide leadership in designing, assessing, and shaping the World Wide Web and emerging Internet technologies. After completing this sequence, students will be able to conceptualize, construct, and critique WWW communications from an intellectual and practical perspective. This concentration also develops competencies in graphics, information architecture, media assessment, and technology applications such as e-business.

In consultation with their advisers, students in the Web Design and Analysis concentration choose 12 credit hours of LL&C electives. Students are especially encouraged to use these electives to take a set of related courses, such as graphics, communication design, or human-computer interaction. A four-credit hour Communication Internship focusing on Web design is also required.

¹ Major Requirement (44 credit hours required) All Communication majors are required to take IHSS-196x or COMM-1510, COMM-2610, and IHSS-196x or COMM-196X (Comm. and Info. Tech.) Students who are following the General Communications major (i.e., those who are not following the Web Design and Analysis or the Graphic Design Concentrations) are also required to take LITR-2110 and WRIT-2110. The remaining 24 credit hours are comprised of courses taken from the Language, Literature, and Communication Department. Courses with the codes COMM, LANG, LITR, and WRIT fulfill the requirement.

B.S. in Communication (Concentration in Web Design and Analysis)**First Year**

Fall	Credit hours	Spring	Credit hours
IHSS-196x/COMM 1510 Intro. to Communication Theory.....4		LL&C Elective ¹.....4	
HSS-196x/COMM 1960 Comm. and Info.Tech.....4		COMM- 2610 Intro. to Visual Communication .....4	
MATH-1500 Calculus I for H&SS.....4		CSCI-1010 Intro. to Computer Programming.....4	
		or	
		CSCI-1100 Computer Science ¹.....4	
		MATH-1620 Contemp. Math Ideas in Society.....4	

Second Year

Fall	Credit hours	Spring	Credit hours
Info. Architecture Requirement ².....4		Graphics Requirement (LL&C) ⁴.....4	
Writing Requirement ³.....4		Open Elective.....4	
H&SS Core.....4		H&SS Core.....4	
CSCI-110 Computer Science I.....4		Math/Science Core ⁸.....4	
or			
CSCI-1200 Computer Science II.....4			

Third Year

Fall	Credit hours	Spring	Credit hours
Approaches to Assessment Requirement (LL&C) ⁵.....4		COMM- 4300 Comm. Internship (focusing on Web Design) ⁶.....4	
LL&C Elective ¹.....4		H&SS Core.....4	
H&SS Core.....4		Open Elective.....4	
Math/Science Core ⁸.....4		Open Elective.....4	

Fourth Year

Fall	Credit hours	Spring	Credit hours
Applications Requirement ⁷.....4		LL&C Elective ¹.....4	
H&SS Core.....4		Open Elective.....4	
Open Elective.....4		Open Elective.....4	
Open Elective.....4			

¹ Twelve additional credit hours in Language, Literature, and Communication Electives. Students are encouraged to take a set of related courses, such as graphics, communication design, or human-computer interaction.

² Four credits, Information Architecture: COMM-4690, WRIT-496x (Adv. Content Dev. for WWW).

³ Four credits, Writing Requirement. Students in the Web Design and Analysis Concentration will meet the writing requirement by taking one of the following courses: WRIT-2110, WRIT-1110, WRIT-2520.

⁴ Four credits, Graphics: COMM-4650, COMM-4660, COMM-496x (Visual Design).

⁵ Four credits, Approaches to Assessment. Students will satisfy this requirement by taking a course that emphasizes either empirical assessment or social/critical assessment.

A) Empirical Assessment: COMM-4420, COMM-4590, COMM-4170 OR

B) Social/Critical Assessment: COMM-2460.

⁶ Four credits, COMM-4300. Students must take a 4-credit hour communication internship focusing on a web design project. It is suggested that this requirement be fulfilled during the junior year.

⁷ Four credits, Applications Requirement: COMM-496x (Web Advertising).

⁸ Math/Science Requirement. Required courses in of math and science are: MATH-1500, MATH -1620, and CSCI-1100, then CSCI-1200, or CSCI-1010, then CSCI-1100. MATH-1010 and MATH-1020 may be substituted for MATH-1500 and MATH-1620, respectively. All students must fulfill the Institute requirement of 24 credit hours of Math/Science. One-credit courses that are graded satisfactory/unsatisfactory do not satisfy science requirements. Please see departmental adviser for more information.

Graphic Design Concentration

The B.S. in Communication with a Concentration in Graphic Design: Theory, Research, Practice provides a curriculum for undergraduate students who seek professional careers in graphic design. This concentration will prepare students for professional practice and graduate study in creative problem solving for print and electronic media. Students completing this sequence will know how to apply theory to the creation of conventional and unconventional communication objects (that includes but is not limited to advertising campaigns, editorial layouts, corporate communications including annual reports and corporate standards, event announcements, advocacy campaigns, and web pages) that convey information to a target audience.

The B.S. in Communication with a Concentration in Graphic Design will require a total of 124 credit hours. It will consist of 64 credit hours of major requirements; 12 credit hours of free electives; and the Rensselaer requirements of 24 credit hours in the humanities and social sciences and 24 credit hours in math, science, and computing courses. The four-credit Communication Internship focusing on graphic design is also required.

B.S. in Communication with a Concentration in Graphic Design:

Theory, Research, Practice

First Year

Fall		Credit hours	Spring		Credit hours
H&SS	Core in Art or Design ⁷	.....4	COMM-4570	Typography	.....4
COMM-2610	Intro. to Visual Communication	.....4	MATH-1620	Contemp. Math Ideas in Society	.....4
COMM-1510/IHSS-196x	Intro. to Communication Theory	.....4		Math/Science Core ⁵	.....4
MATH-1500	Calculus I for H&SS	.....4		H&SS Core in Art History ⁶	.....4

Second Year

Fall		Credit hours	Spring		Credit hours
	Writing Requirement ²	.....4		H&SS Core in Art History ⁶	.....4
COMM-4660	Visual Literacy	.....4	COMM-4690	Intro. to Hypermedia Computing ¹	.....4
COMM-496x	Visual Design	.....4		Math/Science Core	.....4
	Social Science Core ⁸	.....4		Communication Courses	.....4
				in Theory, Research ⁴	

Third Year

Fall		Credit hours	Spring		Credit hours
	Communication Courses	.....4		H&SS Core in Art or Design ⁷	.....4
	in Theory, Research ⁴			Math/Science Core	.....4
COMM-296x	Math/Science Core	.....4	COMM-4650	Inter. Visual Communication	.....4
COMM-496x	Color Theory/			Social Science Core ⁸	.....4
	Adv. Typography	.....4			
	Writing Requirement ³	.....4			

Fourth Year

Fall		Credit hours	Spring		Credit hours
	H&SS Core in Art or Design ⁷	.....4	COMM-4300	Communication Internship	.....4
COMM-496x	Information Design	.....4	COMM-496x	Graphic Design for Corp. Identity	.....4
COMM-4400	Publication Practicum	.....4		Elective	.....4
	Elective	.....4			

¹ *Introduction to Hypermedia Computing or Interaction Design*

² *Students should choose four credits from the following set of courses: Writing: Print and Digital, Creating Electronic Portfolios (two credits), Creative Writing, Presentation Strategies (two credits), and Writing to the World Wide Web.*

³ *Students should choose one of the following courses: Writing for Classroom and Career, Rhetoric and Writing, Proposing and Persuading, or Technical and Professional Communication.*

⁴ *Students should choose two of the following courses: Media Design: Theory and Research, Visual Culture, Rhetoric of the Photograph, Advertising & Culture, Media & Popular Culture, Hypermedia Art & Fiction, Cultural Studies, Art of the Film, Postmodernism and Film, and/or a course in HCI. A comprehensive list of courses will be provided to the adviser each term.*

⁵ *Students may choose between Introduction to Computer Programming or Computer Science 1. The latter is recommended for students who want to minor in Computer Science.*

⁶ *Students should choose the following courses: Art History and Multimedia Century, or another course that the adviser approves.*

⁷ *A list of appropriate courses will be provided to the adviser each term.*

⁸ *Students should choose eight credits from the following set of courses: Cultural Anthropology; Information, Society and Culture; Sociology; Introduction to Science and Technology Studies; or another course that the adviser approves. four credits must be in a design-related course.*

Electronic Media, Arts, and Communication (EMAC) Curriculum

This joint B.S. degree is earned from both the Department of Language, Literature, and Communication and the Department of the Arts. As such, it is interdisciplinary in nature and is therefore described in detail under the heading Interdisciplinary Programs and Research at the end of the Humanities and Social Sciences section of this catalog.

Information Technology and Communication (IT/Comm) Curriculum

The B.S. in IT/Communication is a degree with a concentration, consisting of a 56-credit core in Information Technology and 32 credits taken in Language, Literature, and Communication (LL&C). This degree prepares students for leadership roles in careers such as communication specialists and corporate information officers. Beginning courses introduce students to the basics of communication theory, literacy theory, and written and visual communication. Students in IT/Comm should consider taking course work in one or more of the following LL&C pursuits: communication in new media, visual communication, and human-computer interaction.

All LL&C undergraduate programs strive to accommodate students' differing academic and professional goals, while ensuring that they gain a depth of knowledge in one or more specific areas. Following are some sample programs of study:

First Year

Fall		Credit hours	Spring		Credit hours
ITEC-1210	Information in History & Society.....	4	ITEC-1220	Politics and Economics of IT	4
CSCI-1100	Computer Science I.....	4	CSCI-1200	Computer Science II.....	4
MATH-1010	Calculus I.....	4	WRIT-2110	Rhetoric and Writing.....	4
COMM-1510/IHSS-196X	Intro to Communication Theory.....	4		Math Elective	4

Second Year

Fall		Credit hours	Spring		Credit hours
One of: *			One of: *		
-ECSE-2610	Computer Comp. & Operations	4	-ECSE-2660	Computer Arch., Networking & OS.4	
	and ENGR-2350 Embedded Control ... (1)		-CSCI-2300	Data Structures & Algorithms	
-CSCI-2500	Computer Organization		ITEC-2960	Creative Design in IT	4
ITEC-2210	Intro. to Human Computer Interaction.....	4	LITR-2110	Introduction to Literature.....	4
			Free Elective	.....	4
ITEC-2110	Exploiting the Information World.....	4			
COMM-2610	Intro. to Visual Communication	4			

Third Year

Fall		Credit hours	Spring		Credit hours
ITEC-4310	Managing IT Resources		Communication, Writing, or Language Elective		4
IT Elective (one of):			Probability and Statistics Elective (one of):		
-CSCI-4380	Database Systems	4	-DSES-2010	Statistics for Management	4
-DSES-4530	Information Systems		-ENGR-2600	Modeling / Analysis of Uncertainty	
Communication, Writing, or Language Elective		4	-MGMT-2100	Statistical Methods	
H&SS Elective		4	-PSYC-2310	Experimental Methods & Statistics	
			Science Elective		4
			Free Elective		4

* Select either the first course in both lists or the second course in both lists. Do not select the first course in one list and the second course in the other.

NOTE: Students are expected to notify the instructor at the beginning of the Culminating Experience course that they are taking it for Culminating Experience credit, and they should confer with the instructor to define the course project.

Fourth Year

Fall	Credit hours	Spring	Credit hours
ITEC-4100	IT Capstone Experience .....4	Communication Culminating Experience .....4	
Communication, Writing, or Language Elective .....4		Social Sciences Elective .....4	
Humanities Elective .....4		H&SS Elective .....4	
Science Elective .....4		Free Elective .....4	

Minor Programs

Students in all undergraduate degree level programs are strongly advised to develop a minor in a compatible field of interest. Participation in an internship or co-op is also recommended to allow students to gain professional work experience.

The Department of Language, Literature, and Communication offers a selection of minors for majors in other departments, all of which require at least 16 credit hours.

Communication

To complete this minor, students must take COMM-1510 Introduction to Communication Theory and one 4000-level Communication course. Two additional 4-credit communication courses under the codes COMM-XXXX or WRIT-XXXX are also required.

Literature

A literature minor must include LITR-2110 Introduction to Literature, plus three other 4-credit literature courses under the code LITR-XXXX.

French

This minor consists of four consecutive courses in French, not including French I, and requires at least one course past the French IV level.

German

Required courses for this major include LANG-1320 German II, LANG-2310 German III, and two four-credit, 4000-level German courses. Students beginning the German sequence with German III must take three 4000-level German courses following German III. The appropriate department adviser may approve some course substitutions in order to meet individual student needs.

Graduate Programs

From founding the first graduate program in technical communication in the 1950s to receiving the Association of Computing Machinery Special Interest Group's Diana Award in 1999 for organizational leadership in producing quality documentation to the department's faculty receiving two national teaching awards in 2001, LL&C has been at the forefront of the field. Department faculty includes many active scholars who are winners of national awards for teaching and scholarship from technical communication professional associations. They are also members of the governing boards of these associations. In addition, department faculty members are unusually active in collaborating with corporations to improve processes both at industry work sites and in Rensselaer's educational program.

Currently, the Department of Language, Literature, and Communication's graduate programs consist of three master's level degree programs, a Ph.D. in Communication and Rhetoric, and two certificate programs. Specific details of these programs are outlined below.

** Select either the first course in both lists or the second course in both lists. Do not select the first course in one list and the second course in the other.*

NOTE: Students are expected to notify the instructor at the beginning of the Culminating Experience course that they are taking it for Culminating Experience credit, and they should confer with the instructor to define the course project.

Master's Programs

Master of Science

LL&C offers the M.S. in Technical Communication and in Communication and Rhetoric. The Technical Communication master's degree combines course work in theory, writing, information design, graphics, and analysis of communication systems. This program enables students to work as technical communicators and Web designers and to team with user interface or electronic performance support system designers. In addition to the core M.S. courses, the program integrates courses leading to either the certificate in Human-Computer Interaction (HCI) or the Certificate in Graphics.

The M.S. in Technical Communication with an HCI concentration combines course work in human-computer interaction with theory in allied areas such as technical communication, human factors, and computer science. Students gain a breadth of theory in these areas and applied work in design and software implementation. Compared to graduates of Information Technology and Computer Science programs, these graduates emphasize knowledge of computer usability research and interface design over implementation skills. Graduates of this new HCI-focused curriculum are prepared to work as information architects, usability engineers, interface designers, or Website managers, depending on the student's specific course selections.

The department also offers an M.S. in Communication and Rhetoric, which emphasizes a research approach to communication problems. Drawing on the core M.S. courses, this track additionally provides knowledge of existing research findings and the capacity to conduct original research. Both humanistic and social scientific perspectives are represented. The program enables students to conduct communication research, such as product usability studies in industry and government, and prepares them for doctoral study in communication and rhetoric at Rensselaer or elsewhere.

Both the M.S. in Technical Communication and the M.S. in Communication and Rhetoric require 30 credit hours for completion. Twenty-one of the 30 required credits towards the M.S. degree must come from courses offered by LL&C. Three to six credit hours may be devoted to a thesis. There is no foreign language requirement.

Doctoral Programs

LL&C's Ph.D. in Communication and Rhetoric prepares students for careers in both academic and nonacademic settings. Some graduates become scholars and teachers; others accept government and industry positions that require skills in analyzing and designing human communication systems and practices. In either case, the Ph.D. program graduates draw upon theory and research from multiple disciplines that are central to their work.

Communication and rhetoric doctoral students enjoy a unique opportunity to cross conventional boundaries of academic disciplines. Options include exploring relationships between communication theory and literary theory; studying written, spoken, and electronic communication in both academic and nonacademic settings; relating principles from technical writing to theory and research in cognitive psychology; exploring the relationships between verbal and visual symbol systems used in documents; and learning to use a range of methodologies including textual analysis, ethnographic observation, historical interpretation, and experimental design.

While specific programs of study vary to meet individual needs and interests, all students must complete the following:

- three core courses: COMM-6510 Communication Theory, COMM-6240 Rhetorical Theory I, and COMM-6530 Communication Research
- at least one additional course in research methods

- a coherent sequence of courses within a pathway
- at least one elective course outside the department
- dissertation credits

A pathway is a coherent sequence of courses to be determined in consultation with the student's adviser and dissertation committee, with a concentration of courses in a particular area of scholarship. The department defines three primary pathways, including:

- Communication and Computers
- Media Design and Theory
- Rhetoric, Culture, and Communication Technology.

Adviser and dissertation committee approval is also required in the case of the additional research methods and elective courses.

To complete the Ph.D. program in Communication and Rhetoric requires a minimum of 60 credit hours beyond the master's degree. Students must pass a candidacy examination including both written and oral components, and must successfully defend a written dissertation.

Special Graduate Opportunities

Graphics Certificate

The 12-credit graduate certificate is available as an option in both M.S. programs. The rapid advancement of computer graphics software for page layout, drawing, image editing, and interactive multimedia design presents communicators with a wide range of powerful design options. These technological developments create the need for communicators equally in command of words and visual imagery. The graphics program integrates design theory with in-depth studio work in design for print and electronic media including interactive multimedia design, Web design, and marketing and advertising design. In addition to graphics courses, students may pursue an internship or independent study (focused on graphics) as part of the concentration.

Certificate in Human-Computer Interaction

Computers are now embedded in devices ranging in size from space stations to fingernails, yet human brains must still understand their user interfaces. The Human-Computer Interaction (HCI) Certificate supplies the skills and knowledge students need to work in this new environment, which includes the Web, multimedia, wizards, agents, and still-developing technologies. The HCI certificate program consists of four three-credit courses related to the issues found in human-computer interactions: COMM-6740 Foundations of HCI Usability, COMM-6760 Electronic Coaching Systems, COMM-6750 Communication Design for the World Wide Web, and COMM-6810 Studio Design in HCI. This certificate is available to both on-campus and distance students as either a stand-alone certificate or as an option in both M.S. programs.

Cooperative Education

Rensselaer's Career Development Center operates an extensive cooperative education program. Cooperative education assignments (co-ops) usually last from three to 12 months and provide full-time employment at full-time wages in industry or government. Employers throughout the United States offer LL&C students co-op opportunities in writing, graphic design, and other communication activities. Participating students reap a number of benefits from this experience: skills and practical experience, a concrete application for their academic work, and a way to test their interest in certain types of work.

While co-op opportunities cannot be guaranteed, usually the number of companies interested in sponsoring co-ops exceeds the number of available students. Students should note that co-ops also extend the amount of time required to complete the M.S. degree. Those who seek co-ops must plan to complete required courses while they are on campus. Since a co-op assignment involves full-time work at an

employment site with no opportunity for Rensselaer faculty to directly observe the student's work performance, students are eligible for placement only after they have matriculated in the department, spent at least a semester doing on-campus course work, and have completed COMM-6110 Writing and Editing (Technical Communication); COMM-6820 Foundations of HCI Usability (HCI concentration); and at least one additional LL&C course (such as COMM-6530 Communication Research I). International students should also be aware of the need to satisfy Immigration and Naturalization Service requirements before accepting employment in the United States.

Course Descriptions

Courses related to all LL&C curricula are described in the Course Descriptions section of this catalog under the department codes COMM, LANG, LITR, or WRIT.

Science and Technology Studies

Chair: Sharon Anderson-Gold

Undergraduate Adviser: David Nichols

Director of Graduate Programs: Steve Breyman

Director Professional EEPV Master's Program: Steve Breyman

Department Home Page: <http://www.rpi.edu/dept/sts/>

The Department of Science and Technology Studies (STS) conducts interdisciplinary teaching and research on the social aspects of science and technology. The department also provides undergraduate instruction in anthropology, history, political science, and sociology. Department faculty members are drawn from these disciplines as well as from philosophy and psychology.

Wherever individuals work and live, they must understand the ways in which all aspects of society influence, and are influenced by, science and technology. Rather than holding a divided view of science and technology versus human values and society, STS recognizes both the human dimensions of science and technology, and the scientific and technological dimensions of human existence.

Research and Innovation Initiatives

The Science and Technology Studies Department at Rensselaer Polytechnic Institute is an interconnected network of scholars, activists, and students invested in studying science and technology from multiple perspectives. The strength of the department lies in its intellectual diversity. The department has faculty members trained in and students studying the traditional disciplines of anthropology, design, geography, history, philosophy, political science, sociology, and social psychology. Theoretical approaches encompass critical policy studies, cognitive sciences, cultural theory, ethics, linguistics/semiotics, political economy, simulation/ethnomathematics, and social theory. Objects of study range from the material to artificial worlds. Research within the department has focused on the environment, health, information technology, engineering, and design. The Science and Technology Studies Department is a place where faculty and students pursue studies of power, gender, race, colonialism, and the interactions between research and activism. This matrix of disciplines, theoretical approaches, objects of study, and topical issues inform the scholarship of the department and creates an open, productive, and collaborative intellectual location from which to engage in exploring the multifaceted relationships among science, technology, and human existence.

Faculty*

Professors

Anderson-Gold, S.—Ph.D. (New School for Social Research); ethics, social and political philosophy, history of philosophy.

Caporael, L.R.—Ph.D. (University of California, Santa Barbara); evolutionary theory; decision making, interpersonal dimensions of computing.

Hess, D.—Ph.D. (Cornell University); science, technology, and communities; nutrition and health.

Layne, L.—Ph.D. (Princeton University); medicine and culture, new reproductive technologies, popular images of nature, feminist methods.

Restivo, S.—Ph.D. (Michigan State University); sociology of science, sociological theory.

Winner, L.—Ph.D. (University of California, Berkeley); political theory, politics of technology.

Associate Professors

Breyman, S.—Ph.D. (University of California, Santa Barbara); political economy of environment, science, and society.

Eglash, R.—Ph.D. (University of California, Santa Cruz); African studies, anthropology, black history, cybernetics and virtual communities, math and science education.

Fortun, K.—Ph.D. (Rice University); international politics, environmentalism, and the law.

Hannigan, J.—M.Arch. (Pratt Institute); product design, sustainable systems, history of communication.

Woodhouse, E.J.—Ph.D. (Yale University); policy of science and technology, decision making.

Assistant Professors

Akera, A.—Ph.D. (University of Pennsylvania); history of scientific and technical computing, innovation studies.

Campbell, N.—Ph.D. (University of California, Santa Cruz); drugs and pharmaceutical policy, women and health, women's studies.

Fortun, M.—Ph.D. (Harvard University); historical and ethnographic studies of genomics, biotechnology of life sciences, critical scientific literacy.

Fouche, R.—Ph.D. (Cornell University); history of American technology, theories of race and racism, African-American studies, invention, design, and intellectual property.

Vostral, S.—Ph.D. (Washington University); U.S. history, women's studies, reproductive products.

Clinical Assistant Professor

Boyer, K.—Ph.D. (McGill University); urban design; information technology; gender and work.

Institute Dean and Professor

Phelan, T.—S.TL (Theological College of the Catholic University of America); Institute Dean and Historian.

Adjunct Assistant Professor

Everett, M.—A.B.D. (Erasmus University); sustainable livelihoods and sustainable development.

Young, N.—Ph.D. (University of Chicago); entrepreneurship.

*Departmental faculty listings are accurate as of the date generated for inclusion in this catalog. For the most up-to-date listing of faculty positions, including end-of-year promotions, please refer to the Faculty Roster section of this catalog, which is current as of the May 2004 Board of Trustees meeting.

Undergraduate Programs

The Department of Science and Technology Studies initiated a bachelor of science degree program in the 1985–86 academic year. Rensselaer is a leader among the many American colleges and universities that grant degrees in the field. The STS degree program—Science, Technology, and Society (STS)—is a liberal arts program that prepares students for life and work in a technoscience-based society. Many STS majors choose a dual major in management, science, or engineering. Some graduates will attend professional schools to study corporate or patent law, medicine, policy analysis, or the management of science and technology. Others will use the program to obtain broad exposure in the social sciences and humanities prior to committing to a single discipline for the M.S. or Ph.D. Those entering the job market directly following graduation will find a growing need in consulting firms, major corporations, and government agencies for their unique combination of technical competence and conceptual, writing, and speaking abilities. The Rensselaer STS graduate, therefore, has a distinct advantage over other liberal arts graduates.

Baccalaureate Program

The STS bachelor's program of study requires 124 credit hours, including the standard Rensselaer 24-credit hour humanities and social sciences requirement and 24-credit hour science, math, and computing requirement. At least 32 credit hours are required within the student's major. These must be accompanied by 16 credit hours in a technical area (the technical option) relevant to this STS Major.

The 32 credit hours usually include the following: STSH/STSS-1110 Introduction to STS, two of the 2000-level STS concentration options courses, a methods/statistics option, two of the 4000-level STS advanced options, a public service internship, and a senior project or thesis. The department chair or undergraduate adviser may allow substitutions.

Students must also satisfy the humanities and social science core program, which can be achieved through STSH courses for humanities credit and STSS courses for social sciences credit. Some STS courses are offered with the IHSS code in the first year studies program; all courses with an IHSS code may be counted for either humanities or social sciences credit.

Built into the program are several important elements. Among these is a part-time internship in a government agency or other setting where social issues in science and technology are discussed. Additional elements include skills training in computing, statistics, and research methods; strong development of speaking and writing skills; and opportunities to serve as faculty research assistants.

In cooperation with a faculty adviser, each student tailors a program of study to his or her interests. So, for example, a student interested in environmental issues can combine technical courses in environmental engineering and/or science with STS Advanced Option courses in Environment and Society (see list below). These can also be accompanied by other courses in humanities and social sciences such as ECON-4230 Environmental Economics. An internship with a New York state environmental agency and a senior project on regulation of acid rain or hazardous waste are additional possibilities for environmentally geared students.

Although specific courses will vary based on such individual interests, the template below provides a sample STS curriculum.

Undergraduate Curriculum

First Year

Fall		Credit hours	Spring		Credit hours
MATH-1500	Calculus ¹	4	MATH-1520	Mathematical Methods in Mgmt. and Econo. ¹	4
	Science Seq. ²	4		Science Seq. II ²	4
STSS-1110	Introduction to STS.....	4		STS Conc. Options.....	4
	Hum. or Soc. Sci. Elective	4		Hum. or Soc. Sci. Elective	4

Second Year

Fall		Credit hours	Spring		Credit hours
CSCI-1100	Computer Science I.....	4		Sci. or Math Elective	4
	STS Conc. Options.....	4		STS Methods/Stats. Option.....	4
	Hum. or Soc. Sci. Elective	4		Hum. or Soc. Sci. Elective	4
	Elective.....	4		Elective.....	4

Third Year

Fall		Credit hours	Spring		Credit hours
	STS Technical Option	4		STS Technical Option	4
STSS-4800	Pub. Serv. Internship.....	4		Advanced STS Option	4
	Hum. or Soc. Sci. Elective	4		Hum. or Soc. Sci. Elective	4
	Elective.....	4		Elective.....	4

Fourth Year

Fall		Credit hours	Spring		Credit hours
	STS Technical Option	4		STS Technical Option	4
	Advanced STS Option	4	STSS-4980	STS Senior Project	4
	Electives	8		Elective.....	4

Concentrations

STS offers several concentration “options,” each of which is described below.

STS Concentration options

These are two survey courses, selected with student adviser assistance from among the following five courses, each of which represents one of the concentrations in science and technology. In addition, STSS-2500 Historical and Cultural Perspectives on Science and Technology may be included. STSS-2960 Century of the Gene* may be taken instead of STSS-2100 Medicine and Society and STSH-2960 Design, Culture, and Society* may be taken instead of STSS-2200 Engineering, Design and Society.

STSS-2100 Medicine and Society: Perspectives on Science and Technology	STSS-2400 Law, Values, and Public Policy: Perspectives on Science and Technology
STSS-2200 Engineering, Design, and Society: Perspectives on Science and Technology	STSS-2550 Information, Society, and Culture: Perspectives on Science and Technology
STSS-2300 Environment and Society: Perspectives on Science and Technology	

¹ Other mathematics options may be selected with the permission of the student's adviser.

² The science sequence may be selected, with the assistance of the student's adviser, from among 1000-level introductory sequences in biology, chemistry, geology, or physics, including EARTH-1030, EARTH-1040. See the handout on the science core available from the School of Science. The science or mathematics elective that completes the core requirement in physical, life, and engineering sciences should be chosen, with the assistance of the student's adviser, to prepare for STS Technical Options and/or other electives.

* A special topics course.

STS Methods/Statistics Option is one course, selected with the assistance of the student's adviser, in either (1) research methods, (such as STSS-4130 Decision Making), a third course from among the STS Concentration Options listed above, or under special circumstances, a graduate-level research methods seminar; or (2) statistical methods, such as ENGR-2600 Modeling and Analysis of Uncertainty, ECON-4120 Quantitative Analysis, PSYC-2310 Experimental Methods and Statistics, or DSES-2010 Statistics for Management.

Advanced STS options

These are two related courses selected with adviser assistance from one of the following five lists, each of which represents one of the concentrations on science and technology.

Biology, Medicine, and Society: Perspectives on Science and Technology

STSH-4960 Biofutures*	STSS-4620 History of Medicine
STSS-4260 Sociology of Medicine	STSS-4920 Topics in Science, Technology, and Society
STSS-4530 Body: Self, Symbol, and Politics	STSS-4960 Human Evolution

Environment and Society: Perspectives on Science and Technology

STSH-4300 Environmental Philosophy	STSS-4500 Environment and Development
STSS-4320 Environmental Politics and Policy	STSS-4540 Environment, Law, and Culture
STSS-4390 Environment and International Policy	STSS-4920 Topics in Science, Technology, and Society
STSS-4400 Risky Technologies	

Law, Values, and Public Policy: Perspectives on Science and Technology

STSH-4170 Ethical Issues in Computing	STSS-4310 Politics of Science and Technology
STSH-4230 Engineering Ethics	STSS-4320 Environmental Politics and Policy
STSH-4740 Philosophy of Law	STSS-4330 World Politics
STSH-4920 Topics in Science, Technology, and Society	STSS-4350 Politics of Design
STSS-4110 Social Effects of Science and Technology	STSS-4360 Contemporary Political Thought
STSS-4130 Decision Making	STSS-4390 Environment and International Policy
STSS-4140 Inequality in America	STSS-4540 Environment, Law, and Culture
STSS-4270 Social Relations of Science	STSS-4920 Topics in Science, Technology, and Society

Engineering, Design, and Society: Perspectives on Science and Technology

STSH-4170 Ethical Issues in Computing	STSS-4350 Politics of Design
STSH-4230 Engineering Ethics	STSS-4400 Risky Technologies
STSH-4920 Topics in Science, Technology, and Society	STSS-4560 Gender, Science, and Technology
STSS-4110 Social Effects of Science and Technology	STSS-4650 History of American Technology
STSS-4250 Human Dimensions of Biomedical Technologies	STSS-4660 History of American Science
STSS-4270 Social Relations of Science	STSS-4920 Topics in Science, Technology, and Society
STSS-4310 Politics of Science and Technology	STSS-4960 History of Information Technology*

Information and Society: Perspectives on Science and Technology

STSH-4170 Ethical Issues in Computing	STSS-4600 History of American Science
STSH-4670 History of Information Technology	STSS-4960 Mind, Self, and Culture*
STSS-4130 Decision-Making	STSS-4960 Information Technology: Social, Legal, and Policy Issues*
STSS-4310 Politics of Science and Technology	STSS-4960 AI, Robotics, and Society*
STSS-4350 Politics of Design	
STSS-4650 History of American Technology	

* This is a special topics course

STS Technical options

These four related courses are selected with student adviser assistance from among the course offerings of the Schools of Architecture, Engineering, Management, or Science (and Electronic Arts for dual majors). Students are encouraged to earn a minor or a second major through these courses or in combination with other electives. Minors can be earned, for example, in biology, computer science, environmental engineering, or science and management. The STS adviser may approve a proposal for a technical option in the School of Humanities and Social Sciences.

Dual Major Programs

Many STS majors choose to fulfill the requirements for a second major. For example, a pre-med student pursuing the biology, medicine, and society track within the STS major may pursue a dual major with biology, or an STS major pursuing the information and society track may pursue a dual major with computer science or information technology. There are also dozens of other dual major possibilities. There are also interdisciplinary dual major programs that have been specially developed for STS majors. These include Product Design and Innovation and Ecological Economics, Values, and Policy. For more information on these options, consult the Interdisciplinary Programs and Research section at the end of this Humanities and Social Sciences portion of the catalog.

Minor Programs

The STS department offers five minors, all of which are explained below. These minors generally consist of four related courses in a specialized area of study. At least two of these courses must be at the 4000-level. No Pass/Fail courses may be applied to the minor, and only one transfer or AP course may count for four to six credits. For further information on forming a minor, see the departmental adviser.

In addition to minors administered solely by the STS department, there are some interdisciplinary minor options. These include the interdepartmental minors Ecological Economics, Values, and Policy (EEVP) and Gender, Science, and Technology, and the Interschool Minor in Energy. While the EEVP minor program is outlined below, the latter program is detailed at the end of this departmental section under the heading Interdisciplinary Programs and Research.

STS department administered minors are as follows:

Science, Technology, and Society

All STS courses, including the first-year IHSS-1963 Science, Technology and Society*, may count toward the minor in STS, provided that the restrictions described for all department minors described above are met.

Anthropology

Anthropology is the study of the origins, development, and cultures of the human species. Cultural anthropology studies the full range of human societies—from tribal to complex modern societies. These studies are approached from a cultural perspective involving a community's body of shared knowledge and understanding about the world. The anthropological perspective is multidisciplinary, comparative, holistic, and historical evolutionary.

Anthropology courses are listed under the course code STSS in the Course Descriptions section of this catalog. The following courses are those that the undergraduate director has approved for credit toward the anthropology minor.

*A special topics course.

STSS-1510 Cultural Anthropology
 STSS-2500 Historical and Cultural Perspectives on
 Science and Technology
 STSS-2550 Information, Society, and Culture
 STSS-2940 Readings in Anthropology
 STSS-296X/4500 Environment and Development
 STSS-4530 Body: Self, Symbol, and Politics

STSS-4540 Environment, Law, and Culture
 STSS-4550 The Middle East through Native and
 Western Eyes
 STSS-4560 Gender, Science and Technology
 STSS-4570 Indian Politics and Culture
 STSS-4960 Topics in Anthropology

History

Today's events and circumstances are a consequence of past situations and developments. As a result, understanding the present—as distinct from simply experiencing it—requires attention to history. The disciplined study of the past through written records and artifacts, as well as descriptions of witnesses, commentators, and critics, has long been part of the intellectual foundation of an educated person. History unfolds in ways that sometimes confound the expectations of both logic and predictive science, demonstrating the depth and complexity of human affairs. Thus, historical study provides valuable insight otherwise lacking in a curriculum of specialized, present-oriented branches of science and engineering. Simultaneously, historical cases present valuable evidence for social scientists or managers seeking the regularities of human events. Well-trained professionals ignore such resources at their peril.

History courses are listed in the STSH and STSS sections in the Course Descriptions section of this catalog. The following courses or those approved by the undergraduate director count toward the history minor.

STSH-2670 History of 19th Century Europe
 STSH-296X/STSS 2960 War Since Napoleon*
 STSS-296X Historical and Cultural Perspectives on
 Science and Technology
 STSS-2630 Foundations of American History
 STSS-2640 History of the United States since 1877
 STSS-2680 History of Contemporary Europe
 STSS-2740 World War II

STSS-2940/STSS 4940 Readings in History 1860-1980
 STSS 296X/4960 Topics in History
 STSS-4610 Twentieth-Century Germany
 STSS-4620 History of Medicine
 STSS-4650 History of American Technology
 STSS-4660 History of American Science
 STSS-4960 History of Information Technology

Political Science

Political science is the investigation of how people govern themselves. This investigation encompasses both normative and empirical dimensions, i.e., the goals and purposes of politics as well as the political behavior of people as individuals and in groups. Emphasizing public policy integrates the normative and empirical aspects of political science. Social and economic questions, which always have moral and ethical dimensions, are framed as policy questions and addressed in policy decisions within the political process. Many of the department's political science courses deal explicitly with facets of science and technology policy. The political science curriculum thus provides an excellent adjunct to professional training in science and engineering.

Political science courses are listed under STSS in the Course Descriptions section of this catalog. The following courses or those approved by the undergraduate director count toward the political science minor.

STSS-1310 Principles and Practices of American
 Government
 STSS-1330 International Relations
 STSS-2400 Law, Values, Public Policy
 STSS-4130 Politics of Science and Technology
 STSS-4230 Environmental Politics and Policy
 STSS-4330 World Politics
 STSS-4350 Politics of Design

STSS-4360 Contemporary Political Thought
 STSS-4400 Risky Technologies
 STSS-4500 Environment and Development
 STSS-4800 Public Service/Professional Careers
 Internships
 STSS-2940/4940 Readings in Political Science
 STSS-2960/4960 Topics in Political Science

*A special topics course.

Sociology

Sociology is the study of human interactions and social groups. It concentrates on the aspects and trends of social life that are common to all cultures: social institutions, social problems, social movements, population problems, science, medicine, and social change. The sociologist studies all aspects of social behavior—in couples; families; laboratories and operating rooms; religious, professional, and political organizations; assembly lines; and national and international contexts. This information adds a perspective for understanding human ethical problems, developing policy alternatives, and mitigating emerging social problems.

Sociology courses are listed under STSS in the Course Descriptions section of this catalog. The following course or those approved by the undergraduate director count toward the sociology minor.

STSS-1210 Sociology	STSS-4250 Human Dimensions of Biomedical Technologies
STSS-2100 Medicine and Society	
STSS-4110 Social Effects of Science and Technology	STSS-4260 Sociology of Medicine
STSS-4140 Inequality in America	STSS-4270 The Social Relations of Science
STSS-4200 China: Past and Present	STSS-296X/4960 Topics in Sociology

Ecological Economics, Values, and Policy

The EEVP minor combines the best of both the Economics and STS departments—incisive economic analysis and broad humanities and social science analysis that emphasize the roles science and technology play in today's global political-economy and culture. Given the strong interdisciplinary background acquired in EEVP, graduates can play a leading role in resolving the critical environmental and social problems of the 21st century. The United Nations reports that the demand for EEVP-type program graduates exceeds the supply. According to the UN, it is crucial that we educate people who understand that “sustainable development does not merely deal with the conservation of nature or the management of ecosystems, but more broadly and fundamentally aims at new models of societal development and social transformations.”

EEVP courses are listed under ECON, STSH, and STSS in the Course Descriptions section of this catalog. The following courses or those approved by the undergraduate director count toward the EEVP minor.

Required:

ECON-2010 Managerial Economics
STSS-2300 Environment and Society

Choice of one of the following:

ECON-4230 Environmental Economics
ECON-4240 Natural Resource Economics
ECON-4250 Ecological Economics
ECON-4960 Topics in Economics*

Choice of one of the following:

STSH-4300 Environmental Philosophy
STSS-4540 Environment, Law, and Culture
STSS-4320 Environmental Politics and Policy
STSS-4500 Environment and Development
STSS-4390 Environment and International Policy
STSH/STSS-4920, 4960 Topics in Science, Technology, and Society/STS*

*A special topics course.

Gender, Science, and Technology

This gender studies minor focuses on the ways that gender influences and is influenced by science and technology. Requirements include a total of at least 16 credit hours, eight of which must be at the 4000 level. In addition, all students must take one of the 1000-level courses and the course STSS-4560 Gender Science and Technology.

1000 Level (must take at least one):

IHSS-1960 Art, Technology, and Society²

IHSS-1960/STSH-1110/STSS-1110 Introduction to Science and Technology Studies²

2000 Level:

ARTS-2100 Television and Culture

COMM-2800 Interpersonal Communication

LITR-2770 Women Writers

PHIL-2500 Bioethics

PHIL-2600 Moral Development

STSH-2720 Masculine/Feminine

STSH-2960 Psychology, Culture, and Design*

STSS-2100 Medicine and Society

STSS-2500 Historical and Cultural Perspectives on

Science and Technology

4000 Level

ARTS-6960 Electronic Arts Theory: Contemporary Art
and Culture¹

COMM-4640 Language and Power

COMM-4960 Advertising and Culture¹

PHIL-4300 Feminist Theory¹

PHIL-4750 Cognition and Education

STSH-4300 Environmental Philosophy

STSH-4960 Feminist Theory¹

STSS-4530 Body: Self, Symbol, and Politics

STSS-4560 Gender, Science, and Technology

(required)

Students may cross-register for up to two courses in the Women's Studies Program at Russell Sage College. Contact Linda Layne, program coordinator, at laynel@rpi.edu for more information.

Special Undergraduate Opportunities

Accelerated STS-Law Program

In cooperation with Albany Law School and Columbia University Law School, Rensselaer offers a unique program leading to the B.S. and Juris Doctor (J.D.) in six years rather than the usual seven. Admission to this program is restricted. For Albany Law School, most students are admitted as incoming first-year students. Selected applicants must meet the admission requirements of Albany Law School of Union University. Thus a prospective STS-law student may be able to assure admission to law school prior to beginning an undergraduate career at Rensselaer. Transfer from other Rensselaer curricula to this program is limited to students who have demonstrated academic excellence.

Although guaranteed admission to Albany Law School is only available to selected first-year students, conditional admission is available to accepted Rensselaer students who meet specified achievement levels in their undergraduate program. In addition Rensselaer has established a working relationship with Columbia University Law School that allows an especially gifted STS-law student to become a candidate for admission after his or her third year at Rensselaer, if nominated by a committee within the STS Department. Rensselaer's inclusion in Columbia's Accelerated Interdisciplinary Legal Education Program (AILE) has made this opportunity possible. Accelerated Law students have also applied successfully to such law schools as Harvard, Stanford, Cornell, and the University of Virginia for early admission. The STS Department provides whatever assistance possible for such students. Students should notify the STS undergraduate adviser before the end of the sophomore year to inform him that they wish to be nominated

¹With approval of EEVP Minor Adviser, Professor Steve Breyman, ext. 8515, Sage 5207, or breyms@rpi.edu

²These IHSS-1960 courses are in the First Year Studies Program

*A special topics course.

Five Year B.S.-M.S.

A five-year combined B.S.-M.S. program is available for Rensselaer undergraduates who wish to earn a graduate degree in STS. Students may apply to the program on completion of their sophomore year.

Graduate Programs

Rensselaer's Department of Science and Technology Studies is one of the few such departments in the world to offer STS degrees from the baccalaureate to the doctoral level. Graduate programs lead to the Master of Science and the Doctor of Philosophy degrees in Science and Technology Studies. Rensselaer is committed to developing STS as a field of inquiry emphasizing the historical, political, and social dimensions of our technological society. The diverse STS faculty, drawn from a broad range of academic disciplines, provides students with the concepts and methods necessary to develop an integrated understanding of the culture's technological and human elements.

STS faculty and graduate students are involved in a variety of research projects. Topics include careers of technical professionals, the ethnography of science, history of medicine and the role of quantification, and the nature of scientific inquiry. Additional research efforts focus on gender and reproductive technology; science, psychiatry, and religion; the politics of technological design; community impact of technological change; the impact of scientific instruments; science/government relations; and ethics and values in science and engineering.

Master's Programs

The STS Department offers several master of science degree options, all of which are described in detail below.

Master of Science

This program is designed for students with undergraduate training in the natural and social sciences, engineering, or humanities. In addition, many entering students have substantial career experience relevant to this program.

Completing the M.S. degree in STS requires 30 credit hours, including a six-credit-hour master's thesis or internship. Among the required core courses are STSS-6010 Concepts in Science and Technology Studies, STSS-6110 Research Methods for STS, STSS-6020 Research Seminar, and STSH-6020 Values and Policy. Also required is one additional 6000-level STS seminar (or an independent readings course with three or more students enrolled).

The program offers an opportunity to take technical courses in other Rensselaer departments that are relevant to the student's plan of study. It also offers substantial individual consultation and flexibility in designing course work and developing the thesis/internship option. Students may use the M.S. as a professional program or as a prerequisite for doctoral studies at Rensselaer or other universities.

Five-Year B.S.-M.S

As mentioned in the department's Special Undergraduate Opportunities section, a five-year combined B.S.-M.S. program is available for Rensselaer undergraduates wishing to earn an STS graduate degree. Students may apply to the program on completion of their sophomore year.

Master of Science/Doctor of Philosophy

Students who are enrolled in the M.S./Ph.D. program must complete a total of 90 credit hours (up to 30 in the dissertation). Students in the combined M.S./Ph.D. program are not required to take the core master's courses, but they must take the core doctoral courses and at least one of the following capstone experiences: a research seminar (generally offered as a topics course) or an independent study course,

either of which must result in an article-length research project of publishable quality; a master's thesis; or a master's internship. After completing the core doctoral courses, capstone experience, and 30 credit hours, students will be awarded the degree of Master of Science in Science and Technology Studies.

Doctoral Programs

The STS Department's doctor of philosophy program trains professionals for stewardship of the complex technological society as researchers, teachers, planners, and advisers in academic, government, and private institutions.

The curriculum requires a total of 90 credit hours (up to 30 in dissertation) including 60 hours of study beyond the master's degree. Required courses in the core are STSS-6200 Science Studies, STSS-6040 Technology Studies, STSS-6100 Policy Studies, STSS-6120 Advanced Research Methods, and a theory option. STSS-6030 Nature of Inquiry, STSS-6360 Advanced Contemporary Political Thought, and topics courses such as STSS-6961 Structuralism and Post-Structuralism, STSS-6962 Social Theory, and STSS-6963 Feminist and Postcolonial Theory, or other STS graduate courses approved by the graduate committee to meet the theory option. The graduate committee may also approve substitutions of other graduate courses for Advanced Research Methods, either inside or outside the STS Department. Remaining course work is drawn from three areas: policy studies, science studies, and technology studies. At least two additional 6000-level STS seminars (or independent reading courses of three or more students) must be included. The field examination covers two of these three areas.

Special Graduate Opportunities

Certificate in Multidisciplinary Environmental Studies

This certificate may be awarded to master's students who choose to add 15 credit hours of science and/or engineering, earning the equivalent of a minor in environmental science or engineering. Courses may include BIOL-4850 Principles of Ecology, CHEM-4810 Chemistry of the Environment, EARTH-4810 Environmental Geology, and IENV-4700 One Mile of the Hudson River, or other environmental courses as approved by the adviser. Students should focus their additional 15 credit hours on an area of study that complements their individual project work in the rest of the program.

Course Descriptions

Courses related to all STS curricula are described in the Course Descriptions section of this catalog under the department codes STSH or STSS. Students in these programs often take courses in other Institute departments appropriate to their specific interests.

Interdisciplinary Programs and Research

Few institutions better understand that, in an increasingly complex world, individuals often need a broader range of knowledge than can be obtained through study of a single discipline. As a result, the School of Humanities and Social Sciences has developed a strong selection of multidisciplinary academic and research programs. These programs cross not only disciplines, but allow Rensselaer schools to offer the highest possible degree of multidisciplinary education.

In addition to opportunities in the School of Humanities and Social Sciences described below, other interdisciplinary programs available at Rensselaer are listed in the Interdisciplinary Studies Index of this catalog and are described fully in the section pertaining to the associated Institute school or division.

Electronic Media, Arts, and Communication

The Electronic Media, Arts, and Communication (EMAC) program offers undergraduates the opportunity to study electronic arts in relation to the communication field and prepares them for careers in the applied arts and communication. The B.S. degree in EMAC is earned from both the Department of the Arts and the Department of Language, Literature, and Communication (LL&C). It combines offerings in LL&C and ARTS for a total of at least 60 credit hours and consists of courses taken at four levels.

Required introductory courses at Level One are COMM-1510 Introduction to Communication Theory; COMM-2610 Introduction to Visual Communication; ARTS-1020 Media Studio: Imaging; ARTS-1010 Media Studio: Video/Audio. In Level Two, students complete 24 credit hours in selected LL&C and Arts courses in writing (4), art history/theory (4), and a short list of courses in the areas of electronic art; electronic communication and design; literature, film, media and culture; and professional communication. Level Three requires an EMAC concentration, consisting of 12 credit hours of 4000-level LL&C, Arts, or other courses as part of a plan of study approved by the academic adviser. Senior students at Level Four take eight credits of Honors Capstone or Culminating Experience Sequence, consisting of four credit hours in each of their last two semesters.

First Year

Fall	Credit hours	Spring	Credit hours
IHSS-196x (COMM-1510) Introduction to Communication Theory	4	ARTS-1010 Media Studio: Video/Audio	4
ARTS-1020 Media Studio: Imaging.....	4	COMM-2610 Intro. to Visual Communication	4
MATH-1500 Calculus I for H&SS.....	4	CSCI-1100 Computer Science I.....	4
		MATH-1620 Contemp. Math Ideas in Society.....	4

Second Year

Fall	Credit hours	Spring	Credit hours
EMAC Writing Elective ¹	4	EMAC Art History/Theory	
EMAC Art Elective ³	4	Elective ²	4
Social Science Elective	4	EMAC Language, Literature and	
Math/Science Elective	4	Comm. Elective ⁴	4
		Humanities Elective.....	4
		Math/Science	4

¹ EMAC Writing Electives (4 credit hours required) WRIT-1110; WRIT-2110.

² Art History/Theory Electives (4 credit hours required) ARTS-2100; ARTS-2500; ARTS-2540; ARTS- 2510; ARTS-296x (approved Topics in Art History/Theory); ARTS-4100; ARTS-4120.

³ EMAC Computer Arts Electives (8 credit hours required) ARTS-2010; ARTS-2020; ARTS-2030; ARTS-2040.

⁴ EMAC Language, Literature, and Communication Electives (8 credit hours required)

Students must select courses from two separate areas of EMAC LL&C Electives. These areas are: Electronic Communication and Design, Literature, Film, Media and Culture, and Professional Communication.

Electronic Communication and Design: COMM-296x (approved Topics courses in Electronic Communication and Design); COMM-4340; COMM-4650; COMM- 4690; COMM-4750; COMM-4720; WRIT-2510.

Literature, Film, Media, and Culture: COMM-2410; COMM-2460; COMM-296x (Religion, Culture, and Media), COMM-4580; Any literature course (LITR 2000-4000); LITR-2420; LITR-2460; LITR- 4410; LITR-4450.

Professional Communication: WRIT-2340; WRIT-2360; WRIT-2410; WRIT-2500; WRIT-2520; WRIT-296x. (approved Topics in Profess. Comm.)

Third Year**Fall**

	Credit hours
EMAC Art Elective ⁵	4
EMAC Language, Literature, and Comm. Elective ⁴	4
Social Science Elective	4
Math/Science Elective	4

Spring

	Credit hours
EMAC Concentration ⁵	4
Humanities Elective.....	4
Hum./Soc. Sci. Elective	4
Free Elective	4

Fourth Year**Fall**

	Credit hours
EMAC Concentration ⁵	4
Honors Capstone or Culminating Experience Sequence	4
Free Elective	4
Free Elective	4

Spring

	Credit hours
EMAC Concentration ⁵	4
Free Elective	4
Honors Capstone or Culminating Experience Sequence	4

Ecological Economics, Values, and Policy

Director: Steven Breyman, Science and Technology Studies

The Departments of Science and Technology Studies and Economics jointly offer the Program in Ecological Economics, Values, and Policy (EEVP), which offers both bachelor's and master's of science degrees. EEVP combines the best of both departments—economic analysis and a broader humanities and social science analysis that emphasize the roles science and technology play in today's global economy and culture. Given the strong interdisciplinary background acquired in EEVP, graduates can play leading roles in resolving the critical environmental and social problems of the 21st century. The United Nations reports that the demand for EEVP-type program graduates exceeds the supply. According to the UN, it is crucial that we educate people who understand that “sustainable development does not merely deal with the conservation of nature or the management of ecosystems, but more broadly and fundamentally aims at new models of societal development and social transformation.”

Baccalaureate Program

EEVP has four main components: eight economics courses (all courses are four credit hours), eight STS courses, 10 science or engineering courses, and four free electives as well as an H&SS First-Year Studies course. The science and engineering component should earn the equivalent of a minor in environmental science or engineering, which can cover such topics as ecology, environmental chemistry or geology, water and wastewater infrastructure, and hazardous waste management. In addition, the economics and social science courses that form the core of EEVP equip students with a variety of skills and methods to assess the economic costs, human health impacts, and quality-of-life changes that are associated with the evolving lifestyles and living conditions in today's society. Cultural studies add to EEVP's strong global focus, which prepares students for a successful career in policy analysis, international development, project assessment, and many other areas. The capstone STS Senior Project, on which students work with an adviser from each department, integrates the economics and STS components.

To illustrate a typical distribution of these courses over the regular four-year period of bachelor's degree study, a sample semester layout is provided below.

⁵ EMAC Concentration (12 credit hours at 4000 level required)

A thematic concentration is required of all EMAC majors. ARTS, LL&C, or any thematically related courses in other departments may be taken with approval of the academic adviser. This concentration will provide depth and may lead toward (or be taken in conjunction with) the EMAC Honors Capstone or Culminating Experience Sequence.

Concentrations

The EEVP curriculum offers several concentration “options” each of which is described below.

STS Concentration option In addition to taking STSS-2300 Environment and Society in the fall of the second year, students choose one other STS concentration course: STSS-2100 Medicine and Society; STSS-2400 Law, Values, and Public Policy; STSS-2500 Historical and Cultural Perspectives on Science and Technology; or STSS-2200 Engineering, Design, and Society.

STS Methods/Statistics option Students choose one course in either research methods, such as STSS-4130 Decision Making; or statistical methods, such as PSYC-2310 Experimental Methods and Statistics or DSES-4140 Statistical Analysis.

STS Technical option Students choose four courses, together with the Institute Science core requirement of six courses, to earn the equivalent of a minor in environmental science or engineering. This option includes such courses as BIOL-4850 Principles of Ecology, CHEM-4810 Chemistry of the Environment, and EARTH-1200 Geology II (surface geology) or ENVE courses as approved by the adviser.

Advanced STS option Students choose two courses from the following list:

ECON-4210 Cost Benefit-Analysis
 ECON-4230 Environmental Economics
 ECON-4240 Natural Resource Economics, *and*
 ECON-4250 Ecological Economics
 STSH-4300 Environmental Philosophy
 STSS-4320 Environmental Politics and Policy
 STSS-4390 Environment and International Policy
 STSS-4400 Risky Technologies
 STSS-4500 Environment and Development
 STSS-4540 Environment, Law, and Culture
 STSS-4920 Topics in STS (e.g., Environment and Health)

First Year

Fall		Credit hours	Spring		Credit hours
MATH-1500	Calculus I for H&SS	4	MATH-1520	Mathematical Methods in Mgmt. and Econ.	4
	Science Seq. I	4		Science Sequence II.....	4
STSH-1110	Science, Technology & Society	4		Environment & Society.....	4
ECON-1200	Introductory Economics.....	4	STSS-2300	Free Elective	4

Second Year

Fall		Credit hours	Spring		Credit hours
CSCI-1100	Computer Science I	4		Sci/Math Elective	4
ECON-2010	Managerial Economics.....	4	ECON-2020	Intermed. Macro. Econ.....	4
	STS Concentration Option	4		Free Elective	4
	Free Elective	4		STS Methods/Stats. Opt.....	4

Third Year

Fall	Credit hours	Spring	Credit hours
STSS-4800	STS Tech. Option.....4	ECON-4120	STS Tech. Option.....4
	Public Service Internship .....4		Quantitative Analysis .....4
	Economics Option .....4		Adv. STS Option .....4
	Economics Option .....4		Free Elective .....4

Fourth Year

Fall	Credit hours	Spring	Credit hours
	STS Tech. Option.....4	STSS-4980	STS Tech. Option.....4
	Adv. STS Option .....4		STS Senior Project .....4
	Economics Option .....4		Free Elective .....4
	Economics Option .....4		

Professional Master's Program

The Departments of Science and Technology Studies and Economics also jointly offer an EEVP master's program. The program builds on Rensselaer's nationally recognized expertise and course offerings in the economic, political, social, cultural, and ethical implications in the interactions of science, technology, environment, and society. EEVP is meant for early and mid-career professionals in state and local government, secondary education, business, and the nonprofit sector (professionals in environmental nongovernmental organizations) who wish to upgrade their skills and advance their careers.

Building on required courses in environmental, ecological, and natural resource economics and in environmental philosophy and policy, EEVP helps students acquire the skills such as policy analysis and ecological valuation that are necessary to address the complex multidisciplinary problems any society faces in areas such as environment and health, appropriate technology, and sustainable development. The 21st century promises a continuation of the march toward globalization. Dealing with the prospects and problems of a world economy and the growing human impact on the natural world requires an education that is both broad and deep. EEVP offers "hands on" training that puts into practice the slogan "think globally, act locally."

Economics requirements for the EEVP master's degree include two common courses for a total of six credit hours—ECON/STSS-6600 Seminar in EEVP (the common introductory course) and ECON/STSS-6650 EEVP Professional Project (the common capstone course). Also required are four economics courses for a minimum of 12 credit hours.

Additional requirements include ECON-6490 Introduction to Economic Theory, and two of the following three courses:

ECON-6230 Advanced Environmental Economics

ECON-6240 Advanced Natural Resource Economics

ECON-6250 Advanced Ecological Economics

Sample electives are ECON-4150 Economics of Government Regulation, ECON-4160 Public Finance, ECON-4190 International Economics, ECON-6210 Advanced Cost Benefit Analysis, ECON-6550 Advanced Microeconomic Analysis, and ECON-6590 Advanced Macroeconomic Analysis. In addition, students must take four STS course electives for a minimum of 12 credit hours.

STS course requirements for the EEVP masters include STSH-6300 Environmental Philosophy, STSS-6300 Environment and Social Theory, and one of the following two courses:

STSS-6320 Environmental Politics and Policy

STSS-6540 Environment, Law, and Culture

Sample STS electives are STSH-6020 Values and Policy, STSS-4400 Risky Technologies, STSS-4500 Environment and Development, STSS-6010 Concepts in STS, STSS-6100 Seminar in Science and Technology Policy, and STSS-6400 Environment and Health.

All together, the program totals 10 courses for a minimum of 30 credit hours and can be completed with all 6000-level courses at three credit hours. However, if students choose to take one or two 4000-level electives at four credit hours, they will earn either 31 or 32 credit hours.

Interschool Minor in Energy

Co-directors: Michael K. Jensen, Mechanical Engineering

David J. Hess, Science and Technology Studies

Any thoughtful discussion of the challenges faced in the 21st century will refer to energy. Rensselaer is uniquely able to offer students in any undergraduate major an opportunity to learn about the wide variety of issues involved in understanding energy. The interschool minor in energy includes fundamental courses in architecture, engineering, management, science, and the humanities and social sciences. Any student wishing to develop a multidisciplinary background in energy should consider this minor.

The minor requires a minimum of four courses. Three of these courses, ENGR-1200 Engineering Graphics and CAD, MANE-4960 Topics in Mechanical Engineering, Aeronautical Engineering, Nuclear Engineering, or Engineering Physics, and EARTH-4400 Energy and Mineral Resources, are required.

If any of the above courses are also required for a student's major, the student should substitute an additional course from Option Two below. At least one more course must also be taken from Option One.

Option One

ECON-4240 Natural Resource Economics

STSH-4300 Environmental Philosophy

STSS-2300 Environment and Society

STSS-4320 Environmental Politics and Policy

STSS-4300 World Politics

STSS-4390 Environmental and International Policy

STSS-4400 Risky Technologies

STSS-4500 Environment and Development

STSS-4540 Environment, Law, and Culture

Option Two

ARCH-4350 Energy-Conscious Design

CIVL-2020 Transportation Engineering Fundamentals

ENVE-4430 Nuclear Power Plant Systems

EPOW-4010 Power Engineering Fundamentals

MANE-4700 Solar Devices and Renewable Energy

MGMT-4960 Electric Utilities and Environmental Management*

* This is a special topics course.

Minds and Machines Program

Director: Bram van Heuveln, Cognitive Science

The Minds and Machines (M&M) Program offers students a number of options for the B.S. degree in combination with hands-on research that starts at the beginning of the first year, in connection with the Rensselaer AI and Reasoning Laboratory (RAIR Lab). This course work and research prepares students to build and manage the building of both “smart” machines (e.g., intelligent agents that search the Web, expert systems, robots) and machines enhance human intelligence (e.g., better human-machine interfaces, Web browsers that learn from our surfing, automated theorem-provers). Learning by doing is emphasized and the doing, even for students new to the program, involves hands-on research at the intersection of computer science, logic, psychology, artificial intelligence, and relevant areas of engineering (e.g., computer systems, electrical, mechanical). Research is carried out in the Department’s various labs and includes projects described on the program’s Web site. Much of the undergraduate research in the M&M Curriculum and RAIR Laboratory reflects an entrepreneurial spirit. For example, students working in the gaming area are encouraged to try to build systems that can be sold in the marketplace.

Baccalaureate Program

M&M students select a bachelor of science “trajectory” that matches their interests and the part of the information economy in which they wish to work or the area of graduate study they may wish to pursue. Trajectories include B.S. degrees in:

- Computer Science and Psychology Information Technology and Psychology—appropriate for students interested in gaming technology and gaming industry.
- Information Technology and Pre-Law
- Computer Systems Engineering (or Electrical Engineering or Mechanical Engineering) and Psychology—appropriate for students interested in robotics.
- Computer Science and Philosophy—especially appropriate for students interested in logic-based systems, e.g., expert systems
- Psychology—includes courses having a computational emphasis.

In addition to developing technical expertise in the relevant areas of information technology, the Minds and Machines dual majors allow students to analyze and discuss (with the help of science fiction films) the “big” questions that research and engineering in the program raise. These include questions such as: How smart can machines get? Can they become as smart as human? Is creativity the line that machines will never cross? Can machines be conscious, and how can humans tell?

For further information, access the program’s Web site through the home page of chair, Selmer Bringsjord, at www.rpi.edu/~brings or contact him directly at selmer@rpi.edu.

Typical Four-Year Sequence for Computer Science-Philosophy Dual Major

First Year

Fall	Credit hours	Spring	Credit hours
Computer Science I.....	4	Computer Science II.....	4
Calculus I.....	4	Calculus II.....	4
Introduction to Philosophy.....	4	Intro. to Discrete Structures.....	4
Minds & Machines*.....	4	Philosophy Elective.....	4

Second Year

Fall	Credit hours	Spring	Credit hours
Data Structures & Algorithms.....	4	Models of Computation.....	4
Computer Organization.....	4	Math Elective.....	4
Introduction to Logic*.....	4	Introduction to Cognitive Science*.....	4
H&SS Elective.....	4	Philosophy Elective.....	4

Third Year

Fall	Credit hours	Spring	Credit hours
Programming Languages.....	4	Operating Systems.....	4
Philosophy Elective.....	4	Philosophy Elective.....	4
Science Elective.....	4	Science Elective.....	4
Artificial Intelligence*.....	4	H&SS Elective.....	4

Fourth Year

Fall	Credit hours	Spring	Credit hours
Senior Thesis.....	4	Senior Thesis.....	4
Software D&D.....	4	Comp. Sci. Elective.....	4
H&SS Elective.....	4	H&SS Elective.....	4
Free Elective.....	4	Free Elective.....	4

Sample Four-Year Sequence for Computer Science-Psychology Dual Major**First Year**

Fall	Credit hours	Spring	Credit hours
Computer Science I.....	4	Computer Science II.....	4
Calculus I.....	4	Calculus II.....	4
General Psychology.....	4	Experimental Methods & Statistics.....	4
Minds & Machines*.....	4	Intro. to Discrete Structures.....	4

Second Year

Fall	Credit hours	Spring	Credit hours
Data Structures & Algorithms.....	4	Models of Computation.....	4
Computer Organization.....	4	Math Elective.....	4
Psychology Elective.....	4	Introduction to Cognitive Science*.....	4
Introduction to Logic*.....	4	H&SS Elective.....	4

Third Year

Fall	Credit hours	Spring	Credit hours
Programming Languages.....	4	Operating Systems.....	4
Psychology Elective.....	4	Psychology Elective.....	4
Science Elective.....	4	Science Elective.....	4
Artificial Intelligence*.....	4	H&SS Elective.....	4

Fourth Year

Fall	Credit hours	Spring	Credit hours
Senior Thesis.....	4	Senior Thesis.....	4
Software D&D.....	4	Comp. Sci. Elective.....	4
H&SS Elective.....	4	H&SS Elective.....	4
Free Elective.....	4	Free Elective.....	4

Product Design and Innovation

Director: Jeff Hannigan, Science and Technology Studies

The Schools of Engineering, Architecture, Science, and Humanities and Social Sciences jointly offer this dual major program called Product Design and Innovation (PDI). The program offers four tracks: the first satisfies the requirements for the B.S. programs in both Mechanical Engineering and Science, Technology, and Society (STS); the second satisfies the requirements for the B.S. programs in both Information Technology and STS; the third satisfies the requirements for the B.S. program in both Building Sciences and STS; and the fourth satisfies the requirements for the B.S. program in both Management and STS.

PDI prepares students to become innovative designers capable of developing and designing the advanced products and technologies for the 21st century. Built around a design studio every semester, PDI combines the technical, aesthetic, and cultural sophistication of Rensselaer's engineering, information technology, or building science curricula with the insight and vision of the humanities and social sciences disciplines in the STS curriculum.

Through the PDI core of design studios taken every semester, students obtain a hands-on opportunity that brings together the major curricula. The accredited mechanical engineering curriculum provides a fundamental education in mechanical engineering with a focus on design methodology in general and mechanical design techniques in particular (see template below). The information technology curriculum provides a foundation for applying information technology to other disciplines, including high technology product design. The distinction between product design and software design is that in addition to learning how to design technical aspects of the product, students will create work that is a bridge between both digital and physical form (see template below). The building science curriculum provides a fundamental education in building science and architectural design through basic and advanced courses in structures, environmental, and construction systems, as well as physical and theoretical approaches in design (see template below). The management curriculum provides a fundamental education in management with course offerings in product design, marketing, and entrepreneurship. The STS curriculum provides a fundamental education in the historical, ethical, cultural, and policy dimensions of product development and innovation, including numerous case studies of successes and failures through which students learn what it takes to be effective leaders of design teams. On this basis, the design studios help students explore and develop their creativity while building a portfolio of design experiences continuously throughout all four years.

The design experiences range over a breadth of problems, from larger systemic problems to smaller focused problems, so that students have broad exposure to all the different applications of design practice. Some fall and spring semester studios are taught as a sequence to give students experience with the design process from beginning to implementation. The studios also develop students' skills in using computers and other advanced tools and techniques, as well as in drawing, visualizing, communicating, and working together. In short, the program's design aspects provide the elements necessary to put students' creativity to work as leaders of design and innovation, whether it is in a multinational business at the cutting edge of the global market or in a smaller business that creates an unusual solution to a local problem.

PDI Curriculum in Mechanical Engineering and STS

First Year

Fall		Credit hours	Spring		Credit hours
ARCH-2200	Design Studio I	4	ENGR-2020	Design Studio II ²	4
STSH-1110	Introduction to STS (First-Year Studies)	4	ENGR-1100	Introduction to Eng. Analysis	4
MATH-1010	Calculus I.....	4	MATH-1020	Calculus II	4
ENGR-1300	Chemical Principles for Engineers.....	4	STSH-2960	Design, Culture, and Society.....	4
ENGR-1200	Engineering Graphics and CAD ¹	1	ENGR-1300	Engineering Processes ¹	1

Second Year

Fall		Credit hours	Spring		Credit hours
IHSS-2500	Design Studio III ³	4	ENGR-2050	Introduction to Eng. Design with Prof. Dev.	4
ENGR-1600	Materials Science for Engineers	4	ENGR-2530	Strength of Materials	4
MATH-2400	Intro. to Differential Equations	4	ENGR-2090	Engineering Dynamics	4
PHYS-1100	Physics I for Engineers	4	PHYS-1200	Physics II for Engineers	4
CSCI-1190	Programming	1			

Third Year

Fall		Credit hours	Spring		Credit hours
STSH-4960	Design Studio V (Industrial Design) ² 4		ENGR-4960	Design Studio VI ²	4
ENGR-2350	Embedded Control	4	ENGR-4050	Modeling and Control	4
ENGR-2710	General Manufacturing Processes	3	STSS-4xxx	STS Advanced Option ⁴	4
ENGR-2600	Modeling and Analysis of Uncertainty 3		ENGR-2250	Thermos/Fluids Engineering I	4
STSS-4xxx	STS Advanced Option ⁴	4			

Fourth Year*

		Credit hours			Credit hours
ENGR-4940	Design Studio VII	4	STSS-4980	STS Senior Project ⁷	4
MANE-4260	Design of Mechanical Systems ⁵	3	MANE-4020	Thermal and Fluids Engineering II....	4
STSS-4800	Public Service Internship ⁶	4	MANE-4040	Mechanical Systems Lab.....	2
ENGR-4300	Electronic Instrumentation.....	4	MANE-4020	Thermal and Fluids Lab.....	2
MANE-4030	Elements of Mechanical Design.....	4			
ENGR-4010	Professional Develop. III	1			

* See adviser for fall/spring order of fourth-year courses.

¹ These courses may be taken in any order.

² PDI II, V, VI, and VII satisfy the mechanical engineering requirement for the concentration elective.

³ For PDI students, Design Studio III can be substituted for one of the two STS concentration options.

⁴ Candidate courses include: STSS-4350; STSS-4960; STSS-4960; STSH-4230; STSS-4110; STSS-4250; STSS-4310; STSS-4560; and STSS-4650.

⁵ Can be satisfied with additional semester of MANE-4260, or approved capstone project. See your adviser.

⁶ This course satisfies the requirement for Professional Development II.

⁷ The STS Senior Project can be combined with the Capstone Design Studio to make an eight-credit capstone studio project.

PDI Curriculum in Information Technology and STS¹**First Year**

Fall		Credit hours	Spring		Credit hours
ITEC-1210	IT Revolution ²	4	ITEC-1220	Politics & Economics of IT ²	4
STSH-1110	Science, Technology, & Society ³ (First-Year Studies)	4	MATH-1010	Calculus 1 ³	4
CSCI-1100	Computer Science 1 ³	4	CSCI-1200	Comp Science 2 ³	4
ARCH-196	Design Studio I	4	ENGR-1300	Design Studio II	4

Second Year

Fall		Credit hours	Spring		Credit hours
CSCI-2500	Computer Organization ⁴	4	CSCI-2300	Data Structures and Algorithms ⁴	4
ITEC-2210	Intro. to HCI ⁴	4	STSS-2500	Information, Society, and Culture ⁵ or Design, Culture, and Society ⁵	4
ITEC-2110	Exploiting the Info. World ⁴	4	STSH-2960	Math Core 2 ³	4
IHSS-2500	Design Studio III ⁵	4		Design Studio IV Option: ² (Studio Design in HCI) or other H&SS design course	4
			COMM-4180		

Third Year

Fall		Credit hours	Spring		Credit hours
ITEC-4310	Managing IT Resources ⁴	4		IT Technology Elective ⁴	4
	Science Core Elective ³	4		Science Core Elective ³	4
	Probability & Statistics Elective ⁴	4		STS Advanced Option ⁵	4
	STS Methods Option ⁵	4			
ARCH-4960/ STSH-4960	Design Studio V: Industrial Design ...	4	ITEC-4960	Design Studio VI: Creative Design in IT	4

Fourth Year

Fall		Credit hours	Spring		Credit hours
STSS-4800	Public Service Internship ⁵	4	STSS-4980	STS Senior Project ⁵	4
	STS Advanced Option ⁵	4		HSS Core Elective ²	4
	H&SS Core Elective ²	4		H&SS Core Elective ²	4
ITEC-4100	Design Studio VII: IT Capstone Studio ⁴	4	STSS-4960	Design Studio VIII: PDI Capstone ...	4

¹ The total number of credits is 132.² Fulfills the requirements for the H&SS core.³ Fulfills the requirements for the science core.⁴ Fulfills the IT core requirements. For the Probability & Statistics Elective (fall third year) and the IT Technology Elective (spring third year), see the IT requirements in the Information Technology section of the catalog.⁵ Fulfills the requirements for the second discipline in IT and the STS major core. For the STS Advanced Option (a 4000-level STS course), it is recommended that students select a course in either the "Engineering, Design, and Society" track or the "Information, Society, and Culture" track. See the STS section of the catalog for details on this and other STS course requirements. For PDI students, Design Studio III can be substituted for one of the two STS concentration options.

PDI Curriculum in Building Science and STS**First Year**

Fall		Credit hours	Spring		Credit hours
IHSS-1970	Design, History, and Society	4	ARCH-2210	Architecture Design 1.....	6
MATH-1010	Calculus I	4	STSH-296x	Design, Culture, and Society.....	4
ARCH-2110	The Building And Thinking of Arch. 1	4	PHYS-1050	Physical Principles of Design	4
ARCH-2200	Design Studio	4	ARCH-2120	The Building And Thinking of Arch. 2	2
			ARCH-2510	Materials and Design	2

Second Year

Fall		Credit hours	Spring		Credit hours
IHSS-2500	PDI Studio 3 (Industrial Design) ¹	4	ENGR-2050	Introduction to Eng. Design ³	4
STSS-1110	Introduction to STS.....	4	ARCH-2360	Env. and Ecol. Systems	4
ARCH-2330	Structures 1	4	ARCH-2140	The Building And Thinking of Arch.3	2
ARCH-xxx	Professional Elective	2	BIOL-1010	Intro. to Biology	4
	Science Sequence I ²	4			

Third Year

Fall		Credit hours	Spring		Credit hours
STSH-496x	Design Studio 5	4	ARCH-4960	Design Studio 6 ⁴	4
STSS-4xxx	STS Advanced Option ⁵	4	STSS-4800	Public Service Internship	4
ARCH-4330	Structures 2	4	ARCH-4740	Bldg. Sys. and Env.	4
DSES-2010	Statistics	4		Math Elective	4
ARCH-4810	Advanced Technology Seminar	2			

Fourth Year

Fall		Credit hours	Spring		Credit hours
ARCH-4960	Design Studio 7 ⁴	4	ARCH-4960	Capstone Design Studio with B.S. Final Project	4
STSS-4xxx	STS Advanced Option ⁵	4	STSS-4980	STS Senior Project ⁶	4
ARCH-xxxx	Final Project	2		Elective.....	4
ARCH-4510	Construction Industry Seminar.....	2		Math/Science Elective.....	4
	Elective.....	4			

¹ For PDI students, IHSS-2500 can be substituted for the second STS concentration option.

² The science sequence may be selected, with the assistance of the student's adviser, from among 1000-level introductory sequences in Biology, Chemistry, Geology, or Physics, including EARTH-1030, EARTH-1040.

³ Or other studio course as approved by advisers.

⁴ These special design studios meet jointly with ENGR-4960 Design Studios 6, 7.

⁵ Candidate courses include: STSS-4350, STSS-4960, STSH-4230; STSS-4110, STSS-4250, STSS-4310, STSS-4560, and STSS-4650.

⁶ The STS Senior Project can be combined with the Capstone Design Studio to make an eight-credit capstone studio project.

PDI Curriculum in Management and STS

First Year

Fall		Credit hours	Spring		Credit hours
MATH-1500	Calc. For Management	4	MATH-1520	Math Methods in Mgmt	4
MGMT-1100	Intro. to Management.....	4	MGMT-2510	Micro Comp & Applic.....	4
STSH-1110	Intro. to STS.....	4	STS-296x	Design, Culture & Society	4
IHSS-1500	Design Studio 1	4	ENGR-2020	Design Studio 2	4

Second Year

Fall		Credit hours	Spring		Credit hours
MGMT-2100	Statistical Methods ¹	4	MGMT-4110	Operations Management	4
MGMT-2300	Accounting.....	4	CSCI-1960	Introduction to Computer Prog	4
ECON-1200	Introductory Economics.....	4	MGMT-2320	Managerial Finance	4
STSH-296x	Design Studio 3	4	MGMT-4460	Design Studio 4: Consumer	4
				Behavior & Pro. Des.	

Third Year

Fall		Credit hours	Spring		Credit hours
MGMT-4110	Quant. Methods for Business	4	MGMT-4850	Managing High Perf. Org. 1	4
MGMT-4430	Marketing Principals.....	4	MGMT-1260	External Environ. of Business.....	4
MGMT-4140	Computer Information Systems	4	STSS-4xxx	Advanced Option ²	4
STSS-4xxx	Advanced Option ²	4	ENGR 4960	Design Studio 6	4
STSH-4961	Design Studio 5	4			

Fourth Year

Fall		Credit hours	Spring		Credit hours
MGMT-4860	Managing High Perf. Org. II.....	4	MGMT 4870	Strategy and Policy.....	4
STSH-4800	Public Service Internship	4	STSS-4980	Senior Project	4
	Science Elective.....	4		Science Elective.....	4
	Design Studio 7 ³	4		Design Studio 8 ³	4

¹ PDI Management students are not required to take the Management Leadership sequence, and MGMT-2100 also fulfills the science core requirement.

² The STS Advanced Option includes any 4000-level STS course, but for PDI students the following are especially recommended: STSS-4350; STSS-4960; STSH-4230; STSS-4560; and STSS-4650.

³ For management students, Design Studio 7 and 8 may be replaced by MGMT 4510; and MGMT 4530. They may also be taken as vertical studios with PDI 5 and 6 or other capstone courses worked out in coordination with the PDI program director and STS adviser.