NJIT New Jersey's Science & Technology University

COLLEGE OF SCIENCE & LIBERAL ARTS

College of Science and Liberal Arts
Academic Plan

May 2006

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1. Executive Summary

The College of Science and Liberal Arts has come a long way since it emerged in 1982 as an academic unit without even having an official name. Today, CSLA operates as a typical college of arts and sciences found at comprehensive universities, with strong degree programs from the bachelor's through the doctoral level and a thriving research agenda.

The mission of the College of Science and Liberal Arts (CSLA) is to address the complexities of modern life at the intersection of science, technology, and human values, and provide the intellectual foundations necessary to understand and analyze them. CSLA is dedicated to instruction that develops fundamental principles, informed and enriched by research that encourages innovation, enabling students to formulate significant questions, think analytically, offer creative solutions, and communicate them effectively. CSLA aims to:

- Provide all undergraduates with the fundamentals needed for lifelong learning through the General University Requirements, superior and inspiring learning experiences, and dedicated teaching;

- Prepare the next generation of leaders by providing a broad array of undergraduate and graduate programs and professional education opportunities.

- Conduct highest caliber scholarly research in the biological, mathematical, physical and social sciences; history and the humanities, and engage students, academic, corporate and government partners in this research;

- Support the university's Albert Dorman Honors College in offering an enriching environment for its academically talented students, enhancing their college experiences through an intellectually challenging and engaging curriculum;

- Advance multi-disciplinary interactions - within the College, university and with the larger academic and technology communities - in research, teaching, economic development and the creation of intellectual property in order to address emerging contemporary issues.

CSLA provides academic programs that span the sciences and the liberal arts. The College educates students to be knowledgeable citizens who are able to meet the challenges of a changing world, have a global perspective, and realize their full potential as individuals and members of a technological and diverse society.

CSLA is committed to providing a rigorous, broad, and relevant core curriculum in the sciences and liberal arts that lays the foundation for professional and personal fulfillment for all students, offering programs with emphasis on cross-disciplinary interactions that reflect the interests of students and the demands of the modern world, and conducting scholarship in traditional and emerging directions.

This academic plan was constructed with input from all CSLA departments and the goals articulated here have been carefully crafted as part of the College's Strategic Plan (see Appendix A) developed in 2005 and currently being implemented.

2. Curriculum and Delivery

CSLA's curriculum offerings aim to provide the framework necessary to meet the educational goals of the students enrolled in our courses. Through excellence in our program and course offerings, NJIT will not only maintain, but also improve its competitive position in higher education. The programs will thus offer our students in all disciplines skills that will be valuable for their careers and also enable them to cope with future professional challenges. Our model incorporates efficiency, flexibility and accountability, yet our curriculum is responsive to the changing priorities of our students, the university and our ever-changing society. Our primary goal here is to develop a strong system of curriculum delivery that encourages excellent teaching, offers optimal learning conditions, and allows for timely degree completion.

2.1 Degree programs and courses

2.1.1 Academic

The academic programs offered by the departments of the College of Science and Liberal Arts along with their concentrations are:

<u>Undergraduate Degree Programs</u>

- Applied Physics (BS degree)
  Options/Concentrations in:
  - Astronomy
  - Biophysics
  - Optical Science and Engineering
- Biology (BS and BA degrees)
- Chemistry (BS degree)
- Communication (BS and BA degrees)
  The BA is more humanistic; the BS more technological.
  Options in:
  - Literature (with an option in Education)
  - Media Arts
  - Professional and Technical Communication (with an option in Journalism)
- Environmental Science (BS degree)
  Options/Concentrations in:
  - Biocomplexity
  - Chemistry of the Environment
  - Environmental Policy Studies
  - Sustainable Earth
- History (BA degree)
- Mathematical Sciences (BS degree)
  - Applied Mathematics
  - Applied Statistics
  - Mathematical Biology
  - Mathematics of Finance and Actuarial Science

- Science, Technology and Society (BS degree)

Students may pursue double major or dual degrees in almost any combination of fields. The double major requires students to satisfy the requirement of two majors, where, for example, some courses may count toward both majors. The dual degree requires 30 credits beyond those taken for a single major and the student then earns two degrees.

Several double major opportunities have been developed by CSLA for students who want to major in two different disciplines without having to take the extra 30 credits necessary for the dual degree. It is sometimes possible for excellent students to complete such a program in four years. The double majors falling into this category are:

- Applied Physics/Computer Science
- Applied Physics is one of the concentrations in the Information Technology major.
- Mathematical Sciences/Applied Physics
- Mathematical Sciences/Computer Science
- Mathematical Sciences/Information Systems
- Mathematical Sciences/Biology
- Mathematical Sciences (Applied Mathematics option) is one of the concentrations in the Information Technology major.

<u>Graduate Degree Programs</u>

- Applied Mathematics (MS)
  Specializations in:
  - Analysis
  - Applied Mathematics
  - Computational Mathematics
  - Mathematical Biology
- Applied Chemistry (MS)
- Applied Physics (MS and PhD)
- Applied Statistics (MS)
- Biology (MS)
- Biology (PhD)
  Tracks in:
  - Cell/Molecular/Biochemical Biology
  - Computational Biology
  - Ecology/Evolution
- Chemistry (PhD)
- Environmental Policy Studies (MS)
- Environmental Science (MS and PhD degrees)
- History (MA)
  Tracks in:

    - American History
    - World History
    - History of Technology, Environment, and Medicine/Health
- History (MAT)
- Mathematical Sciences (PhD)
  Tracks in:
    - Applied Mathematics
    - Applied Probability and Statistics
- Professional and Technical Communication (MS)
- Public Health (MS)
  Tracks in:
    - Health Policy and Administration
    - Quantitative Methods: Biostatistics and Epidemiology
    - Urban and Environmental Health

Additionally, CSLA offers minors in Applied Math, Applied Physics, Applied Statistics, Chemistry, Drama/Theatre, Economics, Ethics, Global Studies, History, Legal Studies, Literature, Philosophy/Applied Physics, Professional Communication, Science/Technology/Society, ROTC and Technology /Gender/ Diversity.

We are also strengthened by a special relationship with Rutgers-Newark. We have the advantage of tapping into the arts programs at Rutgers, just as they can tap into our science programs. This allows us to focus on areas of strength and expertise strategic to NJIT's mission. There are strong connections between every CSLA department and/or program and its counter part at Rutgers-Newark. These relationships range from strong federation governed by a specific memorandum of understanding to an equipment sharing arrangement (see listing below). NJIT and Rutgers-Newark also have such relationships in all other colleges and schools. It will be beneficial for these arrangements to come under a general agreement that covers common grounds that will be supported by appendices dealing with the details of each different area. A draft template for such an agreement is included in Appendix B.

Biology	(Federation) Joint BA-BS/MS/PhD; NJIT faculty on Rutgers Campus
Environmental Science	Joint BS/MS/PhD
Chemistry	Equipment-sharing arrangements
History	(Federation) Joint BA/MA/MAT
Geology	Rutgers faculty on NJIT campus (York Center)
Mathematical Sciences	Joint BA/PhD
Physics	(Partnership) Joint BS/MS/PhD
Theatre	Joint Program Administration
Teacher Certification	Collaboration-State Approved
Public Health	Joint MPH (also w/ UMDNJ)

2.1.2 Coop and intern

CSLA departments encourage students at both the undergraduate and graduate levels to participate in internship and cooperative education opportunities. However, we are currently working to improve our presence in this area and develop strategies that will lead to more such opportunities for CSLA students, particularly as our enrollment and graduating classes grow. To this end, we will strive to achieve the following:

- We will communicate with the office of Career Development Services (CDS) personnel with regard to the skills and types of career opportunities for which CSLA students are qualified so that more of the companies that visit campus or recruit NJIT students at Career Fairs or for Coop or Internship opportunities recognize that CSLA majors have the desired skills.

- We will develop methods to track where CSLA graduates go after earning their NJIT degrees or after earning another degree following their years at NJIT. The goal is to develop a cohort of companies for which our alumni work and thus contacts at these companies. We can then work with CDS to develop internship opportunities at these companies for CSLA students.

2.1.3 Pre-professional

All CSLA undergraduate programs can be used as stepping stones to professional degrees in Medicine, Dentistry, Optometry, and Law when appropriate prerequisite courses are taken. Also, NJIT was recently authorized by the State of New Jersey to offer teaching certification options to our students. A student, by taking 30 education credits at Rutgers/Newark, can graduate with a degree in any of CSLA's undergraduate majors and obtain a teaching certification at the time of graduation from NJIT. Similarly, CSLA has also established articulation agreements with the University of Medicine and Dentistry of New Jersey to offer our undergraduates the opportunity to pursue the Doctorate in Physical Therapy and the Masters in Physician Assistant.

Accelerated Premedical, Predental, and Preoptometry curricula:

- Biology
- Chemistry
- Environmental Science
- History
- Mathematical Sciences
- Physics
- Science, Technology and Society
- Communication

Accelerated Prelaw Curricula:

- Biology
- Chemistry

- Environmental Science (policy option)
- History
- Mathematical Sciences
- Science, Technology and Society
- Communication
- Physics (pending)

Options for the Doctorate in Physical Therapy

- Biology
- Chemistry
- Mathematical Sciences
- Physics
- Communication
- Science, Technology and Society

Options for the Masters in Physician Assistant

- Biology
- Chemistry
- Science, Technology and Society

2.2 College/school GUR

In addition to the degree programs offered by the College, CSLA is entrusted with much of the delivery of the university's general education component. All NJIT students must currently take courses in mathematics (at least 6 credits), natural sciences (at least 7 credits), English (at least 3 credits), social sciences (6 credits) cultural history (6 credits), and in an elective category of humanities/social sciences (9 credits). Other GUR requirements (2 credits of Computer Science, 6 credits of Engineering Technology, 3 credits of Management and 2 credits of Physical Education) are provided outside of CSLA. Thus, 37 of the 50 GUR credits required for graduation of an NJIT undergraduate are typically attained through enrollment in CSLA courses. Of course, many curricula require additional credits in these subjects beyond the prescribed GUR as well as elective courses in CSLA disciplines. In addition, a large number of students take developmental courses through CSLA.

NJIT is dedicated to producing graduates who have the knowledge, skills and motivation necessary to advance the state-of-the-art in their respective fields for the benefit of contemporary society and have a deep understanding of and appreciation for science and technology and related ethical and societal issues. CSLA supports the concept that we must provide students with the broadly based liberal arts and science education needed for professional success. It is also important that the specific GUR requirements that form the foundation of every NJIT student's education be revisited on a regular basis. In addition to the skills and knowledge learned in courses in students' majors, NJIT graduates must be able think, create and communicate clearly. Our GUR requirements are designed to provide these skills to all students in all our programs.

A fundamental guiding principle in the development of the Common Core Requirements (CCR) for the College of Science and Liberal Arts (CSLA) at NJIT is the formulation of a foundational curriculum that encompasses the necessary prerequisites for success in our undergraduate disciplines and espouses devotion to lifetime intellectual discovery and personal development. In a larger sense, the CCR are intended to provide an educational grounding for our students that is harmoniously attuned to the mission of NJIT and its responsibilities to its constituents. In essence, the CCR represent those first necessary steps in the fulfillment of the implicit intellectual and social contract that NJIT has with its students and its local, national, and global communities.

The CCR, along with other programmatic requirements, are key elements in realizing the educational mission and vision of CSLA. Our curricula, for which the CCR provide the foundation, are designed to produce graduates who are equipped to play leading roles in our global, technological, multidisciplinary, culturally diverse, and rapidly changing society. To flourish in such a world, NJIT graduates need to have a solid grounding in the sciences, mathematics, and computing. They must also possess excellent communication skills and have an appreciation of history; and they ought to be conversant with culture, literature, art, and the great ideas that have shaped contemporary society. The graduates must also experience the multidisciplinary nature of learning and be keenly aware of the global, multicultural, economic, and organizational realities of our modern society. These requirements are not immutable educational tenets – they must be flexible enough to maintain their contemporary relevance without compromising their core of fundamental knowledge.

The CCR provide the foundation for building the instructional edifice necessary to achieve these goals. In summary, this core curriculum is intended to lay the groundwork for the education of an *educated citizen* possessing not only a breadth of knowledge in the sense of a classical liberal education, but a more substantial grasp of the fundamentals and practice of science and technology.

It cannot be expected that CCR will provide the totality of prerequisites for the many areas of study offered at NJIT. In fact, all of the disciplines will have their own requirements complementary to the CCR. Building upon the foundation of the CCR, all undergraduate programs are expected to educate students such that they become proficient in clearly defined areas that can be measured through course and curriculum activities.

The Undergraduate Curriculum Review Committee (UCRC) in the process of evaluating all college/school models for general education in order to establish a new version of the university's General University Requirements. CSLA will endorse the outcome of UCRC's efforts.

Included in our proposal for a Core Requirements for all College of Science and Liberal Arts students are the following:

Mathematics (6 credits)

The study of mathematics introduces students to fundamental concepts such as limits, rates of change, and estimation and to logical and rigorous thinking. Mathematical modeling provides the theoretical framework to understand many areas of practical application. The ability to reason both qualitatively and quantitatively is fundamental to success in all NJIT programs; students must master mathematics at least through the level of calculus and understand the basic principles of probability and statistics.

> *One first-year calculus course and at least one (1) credit of course work in probability and statistics, or equivalent.*

Natural Sciences (7 credits)

The development and application of new technologies require scientifically literate citizens who can understand technological issues and evaluate the role of science in society. Students need to learn to distinguish between testable and untestable ideas, recognize scientifically valid tests of theories, and understand how information relates to those tests. They also need to learn to reason both inductively and deductively, develop and test scientific hypotheses, and understand the value and limitations of scientific studies.

> *A sequence of two first-year courses in one discipline, or two courses in different disciplines, selected from biology, chemistry, and physics including one laboratory-based course.*

Communication and Cultural History (9 credits)

Among the essential characteristics of educated individuals are the ability to use language to communicate ideas and an understanding and appreciation of human history. All communication and cultural history courses are writing-intensive.

Communication (3-6 credits)

Students need the ability to convey information in written, oral and visual forms to a variety of audiences. The ability to research information from traditional print and electronic sources, to cite those sources properly, and to exercise critical thinking is expected of all students, both in their humanities courses and in the courses within their majors.

Cultural History (3-6 credits)

Students need to be familiar with the achievements of their own and other cultures. To prepare for lives and careers in our global society, they should know about past events and the traditions of literature and the arts as they

continue to influence our world and to reflect both short- and long-range perceptions of the human condition.

Three 100/200 level courses, either at NJIT or Rutgers-Newark, including at least one course in communication and at least one course in cultural history.

Social Sciences (9 credits)

Social sciences are concerned with human behavior, human interactions, human environment, and related social structures and forms. The social sciences are essential to an understanding of the economic, social, and political forces at work in our world. This requirement enables students to deepen their knowledge and understanding of human society, how people and institutions interact , and learn to apply that knowledge to various personal, organizational, and societal issues.

Three courses, either at NJIT or at Rutgers-Newark, may be selected from approved courses in the following disciplines: anthropology, criminal justice, economics, environmental studies, geography, management, political science, psychology, or sociology. Certain courses in history and in science/technology/society (STS) may also qualify.

Humanities and Social Sciences Electives (9 credits)

The ideals of a liberal education transcend particular major fields and career goals; students are expected to develop interest and knowledge in specific areas within the humanities and social sciences. The required lower-level courses provide the foundational knowledge and communication skills needed for and demonstrated in upper division electives.

Lit/Hist/Phil/STS (3 credits)

Students must take one 300-level course, either at NJIT or at Rutgers-Newark, from any of the following verbally-centered disciplines: history, literature, philosophy, science/technology/ society (STS).

Open Elective in Humanities (3 credits)

Students must take one 300-level course, either at NJIT or at Rutgers-Newark, from any of the following fields: art, English, history, literature, music, philosophy, science/technology/society (STS), or theatre.

Senior Seminar in Humanities and Social Science (3 credits)

Senior seminars are specially-designed humanities and social science courses in which students participate in the exploration of a particular issue, problem, or area of study from an interdisciplinary perspective. These seminars will provide students with the opportunity to make formal oral presentations, undertake independent research, and produce a major paper or project.

Three 300/400-level courses in the humanities and social sciences, elected by each student from among the approved courses offered at NJIT and Rutgers-Newark.

Computing and Information Technology (3 credits)

Fluency in computing and information technology is an interdisciplinary qualification. Competency with the constituents of the information age – computers, software, communication, digital information-- allows students to express themselves creatively, conduct research, reformulate knowledge, synthesize new information and, depending on the discipline, apply programming techniques to solve problems. It is also essential that students understand the cultural and ethical implications of the uses of the contemporary technology.

One first-year course in computing and information technology.

2.3 Service Courses

In addition to the provision of many of the GUR courses taken by NJIT students, CSLA also provides many service courses that are taken by the various majors as part of their major core or elective course (for example, engineering/computing students must take more than the 6 credits of math required in the GUR). These courses come from both the sciences side and the liberal arts side. An exhaustive list of such courses is beyond the scope of this document, although it is clear that a large portion of the undergraduate inventory of the CSLA courses are there for GUR or service purposes.

2.4 Course Delivery plan [Based on course distribution data provided by IRP]

2.4.1 Courses by semester for year [What is offered and by whom?]

In Tables 2.4.1.1-6 (below) we present the number of courses being offered and the number of students being taught by our faculty and instructional staff. CSLA takes its service mission seriously and strives to accommodate the needs of all majors and students, not only in the GUR area but also in many more courses that are taken as electives. However, there are issues to deal with and improvements to be made to make sure that all students trying to get into such courses required for their degrees are accommodated. Often, some of these courses (GUR courses or English/science/math courses required for majors of other NJIT colleges) reach capacity before registration is completed and thus students are faced with closed

courses. The situation is currently being addressed by either increasing class size or adding new sections. However, due to the space limitations of many NJIT classrooms, sometimes class size cannot be increased, and, due to limitations on adjunct funding, the number of sections cannot always be increased to handle this need, although the situation with adjunct budgets has eased considerably in 05-06 academic year.

The limitation on the availability of the number of classrooms is also an issue here. The university's teaching spaces and facilities consist of classrooms, lecture halls and laboratories. The overwhelming majority of courses run in classrooms with a capacity ranging between 40 to 60 seats. Specifically, we have 48 classrooms with a 40 seat capacity; 23 larger classrooms with 40-60 seat capacity; 10 medium size lecture halls with a 60-100 seat capacity, 4 lecture halls with a 116 seat capacity; and one (1) large lecture hall with 164 seat capacity. (Some classrooms have capacity less than 40). Thus, increasing class size would lead to facilities problems.

As to funding for adjuncts, the CSLA budget for adjuncts over the past four years had been going down at the same time as the total number of faculty and special lecturers had also decreased. The adjunct budget for this year shows an increase. It is important to note here that CSLA teaches about 40% of total sections and students at the university. Tables 2.4.1.1-2.4.1.6 provide a breakdown of teaching by department and instructor category for the Fall 05 semester and Table 2.4.1.8 shows adjunct expenditures from 2002-2006.

Table 2.4.1.1 For CSLA undergraduate lecture and lab courses, we present the number of sections, the number of students in those sections and the percentage of sections taught by each of adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors and teaching assistants. The percentages listed are separate for Lecture courses and for Lab courses, i.e., summing the last number in a given column for the Lecture rows only will result in 100%. The same is true of the Lab rows.

TABLE 2.4.1.1

Undergraduate Course Sections / Students Taught / % sections (05F)

	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Lecture						
Adjunct	27/652/53	3/85/16	36/708/29	27/711/23	8/142/6	101/2298/23
Lecturer	15/385/29	3/68/16	58/1220/46	28/817/24	90/2100/69	194/4590/44
Asst. Prof.	2/46/4	5/127/26	8/160/6	15/409/13	11/234/8	41/976/9
Assoc. Prof.	1/19/2	2/63/11	10/242/8	24/635/21	5/118/4	42/1077/10
Professor	4/106/8	5/121/26	12/248/10	19/437/16	13/280/10	53/1192/12
Dist.Prof.	1/38/2	1/30/5	0/0/0	0/0/0	3/74/2	5/142/1
TA	1/34/2	0/0/0	1/23/1	4/127/3	0/0/0	6/184/1
Lab						
Adjunct	2/113/40	0/0/-	0/0/-	0/0/-	2/43/4	4/156/7

Lecturer	0/0/0	0/0/-	0/0/-	0/0/-	2/40/4	2/40/3
Assoc. Prof	3/40/60	0/0/-	0/0/-	0/0/-	2/47/4	5/87/8
Professor	0/0/0	0/0/-	0/0/-	0/0/-	1/24/2	1/24/2
TA	0/0/0	0/0/-	0/0/-	0/0/-	47/874/87	47/874/80

Table 2.4.1.2 For CSLA undergraduate lecture and lab courses below the 300 level, we present the number of sections, the number of students in those sections and the percentage of sections taught by each of adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors, teaching assistants and others. The percentages listed are separate for Lecture courses and for Lab courses, i.e., summing the last number in a given column for the Lecture rows only will result in ~100%. The same is true of the Lab rows.

TABLE 2.4.1.2 Courses below 300 level						
Undergraduate Course Sections / Students Taught / % sections (05F)						
	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Lecture						
Adjunct	9/179/30	3/85/60	33/732/45	25/645/28	7/138/6	77/1779/24
Lecturer	12/270/40	1/9/20	33/742/45	20/557/23	85/2033/68	151/3611/47
Asst. Prof.	1/34/3	1/30/20	0/0/0	13/362/15	11/234/8	26/660/8
Assoc. Prof.	1/19/3	0/0/0	5/125/7	15/471/17	5/118/4	26/733/8
Professor	3/74/10	0/0/0	0/0/0	12/317/14	9/204/7	24/595/7
Dist.Prof.	0/0/0	0/0/0	0/0/0	0/0/0	3/74/2	3/74/1
TA	0/0/0	0/0/0	1/34/1	3/106/3	0/0/0	4/140/1
Other	4/125/13	0/0/0	1/15/1	0/0/0	5/125/4	10/265/3
Lab						
Adjunct	2/113/40	0/0/-	0/0/-	0/0/-	2/43/4	4/156/7
Lecturer	0/0/0	0/0/-	0/0/-	0/0/-	2/40/4	2/40/3
Assoc. Prof	3/40/60	0/0/-	0/0/-	0/0/-	2/47/4	5/87/8
Professor	0/0/0	0/0/-	0/0/-	0/0/-	1/24/2	1/24/2
TA	0/0/0	0/0/-	0/0/-	0/0/-	47/874/87	47/874/80

Table 2.4.1.3 For CSLA undergraduate lecture courses above the 300 level, we present the number of sections, number of students in those sections and percentage of sections taught by adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors, teaching assistants and others, respectively. The percentages listed are separate for Lecture courses and for Lab courses, i.e., summing the last number in a given column for Lecture rows will result in 100%. This is also true for Lab rows.

TABLE 2.4.1.3 300 and 400 level courses						
Undergraduate Course Sections / Students Taught / % sections (05F)						
	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Lecture						
Adjunct	5/73/63		6/127/13	2/66/7	1/4/25	14/270/14

Lecturer		2/59/17	14/298/30	9/279/30	2/20/50	27/656/26
Asst. Prof.	1/12/13	4/97/33	6/131/13	2/47/7		13/287/13
Assoc. Prof.			4/102/9	9/164/30		13/266/13
Professor	1/17/13	5/121/41	10/207/21	7/119/23		23/464/23
Dist.Prof.	1/38/13	1/30/8				2/68/2
TA			1/23/2	1/21/3		2/44/2
Other			7/122/15		1/8/25	8/130/8

Table 2.4.1.4 For CSLA graduate lecture courses, we present the number of sections, the number of students in those sections and the percentage of sections taught by each of adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors and teaching assistants.

TABLE 2.4.1.4						
Graduate Course Sections / Students Taught / % sections (05F)						
	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Lecture						
Adjunct	10/116/71	0/0/-	0/0/0	1/19/5	0/0/0	11/135/22
Lecturer	0/0/0	0/0/-	3/43/43	0/0/0	2/13/22	5/56/10
Asst. Prof.	2/26/14	0/0/-	2/29/29	4/56/21	2/8/22	10/119/20
Assoc. Prof.	0/0/0	0/0/-	1/15/14	5/83/24	0/0/0	6/98/12
Professor	2/25/14	0/0/-	1/17/14	8/90/38	4/10/44	15/142/31
Dist.Prof.	0/0/0	0/0/-	0/0/0	1/10/5	1/1/11	2/11/4

Table 2.4.1.5 For all CSLA lecture and lab courses, we present the number of sections, the number of students in those sections and the percentage of sections taught by each of adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors and teaching assistants. Note that the percentage in the final row reads across; it is the percent of sections of CSLA lectures and labs that are Chemistry courses, History courses, etc.

TABLE 2.4.1.5						
Total Course Sections / Students Taught / % of Sections (05F) (with Labs)						
	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Adjunct	39/881/56	3/85/16	36/708/27	28/730/21	10/185/5	116/2589/21
Lecturer	15/385/21	3/68/16	61/1263/46	28/817/21	94/2153/49	201/4686/37
Asst. Prof.	4/72/6	5/127/26	10/189/8	19/465/14	13/242/7	51/1095/9
Assoc. Prof.	4/59/6	2/63/11	11/257/8	29/718/21	7/165/4	53/1262/10
Professor	6/131/9	5/121/26	13/265/10	27/527/20	18/314/9	69/1358/13
Dist. Prof.	1/38/1	1/30/5	0/0/0	1/10/1	4/75/2	7/153/1
TA	1/34/1	0/0/0	1/23/1	4/127/3	47/874/24	53/1058/10
Total	70/1600/13	19/494/3	132/2705/24	136/3394/25	193/4008/35	550/12201/100

Table 2.4.1.6 For all CSLA lecture courses (without labs), we present the number of sections, the number of students in those sections and the percentage of sections taught by each of adjuncts, lecturers, assistant professors, associate professors, professors, distinguished professors and teaching assistants. Note that the percentage in the final row reads across. It is the percent of sections of CSLA lectures that are Chemistry courses, History courses, etc.

TABLE 2.4.1.6

Total Course Sections / Students Taught / % of Sections (05F) (without Labs)

	Chemistry	History	Humanities	Mathematics	Physics	**Total**
Adjunct	37/768/57	3/85/16	36/708/27	28/730/21	8/142/6	112/2433/23
Lecturer	15/385/23	3/68/16	61/1263/46	28/817/21	92/2113/66	199/4646/41
Asst. Prof.	4/72/6	5/127/26	10/189/8	19/465/14	13/242/9	51/1095/10
Assoc. Prof.	1/19/2	2/63/11	11/257/8	29/718/21	5/118/4	48/1175/10
Professor	6/131/9	5/121/26	13/265/10	27/527/20	17/290/12	68/1334/14
Dist. Prof.	1/38/2	1/30/5	0/0/0	1/10/1	4/75/3	7/153/1
TA	1/34/2	0/0/0	1/23/1	4/127/3	0/0/0	6/184/1
Total	65/1447/13	19/494/4	132/2705/27	136/3394/28	139/2980/28	491/11020/100

For Spring 2006, we present data concerning course enrollments and the faculty that teach those courses in CSLA.

In the 2.4.1.7 tables, we present similar data for the Spring 2006 semester. One aspect of the information these tables provide is the fraction of credit hours taught by categories types of faculty.

Table 2.4.1.7a Data for Spring 2006 for all Undergraduate CSLA courses. For all undergraduate courses in CSLA, 32% of Contact hours were delivered by tenure-track faculty, 65% by Lecturers, Instructors, Adjuncts and TAs with 3% unknown.

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Resh Prof	Visiting Prof	Inst	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)	3.0	164.0	166.5	166.5	456.5	5.0	3.0	53.0	371.5	77.0	45.0	1511.0
		Contact Hours(%)	0.2%	10.6%	10.8%	10.8%	29.5%	0.3%	0.2%	3.4%	24.0%	5.0%	2.9%	97.8%
		Credit Hours (#)	3.0	173.0	161.0	165.0	497.0	6.0	3.0	65.0	401.0	43.0	42.0	1559.0
		Credit Hours(%)	0.2%	10.9%	10.1%	10.4%	31.2%	0.4%	0.2%	4.1%	25.2%	2.7%	2.6%	97.9%
		Enrolment	7	1274	1288	1356	4154	37	42	652	3598	738	327	13473
Lec.Lab.Studio Contact Hours (#)			3.0	164.0	166.5	166.5	456.5	5.0	3.0	53.0	371.5	77.0	45.0	1511.0
Lec.Lab.Studio Contact Hours(%)			0.2%	10.6%	10.8%	10.8%	29.5%	0.3%	0.2%	3.4%	24.0%	5.0%	2.9%	97.8%
Lec.Lab.Studio Credit Hours (#)			3.0	173.0	161.0	165.0	497.0	6.0	3.0	65.0	401.0	43.0	42.0	1559.0
Lec.Lab.Studio Credit Hours(%)			0.2%	10.9%	10.1%	10.4%	31.2%	0.4%	0.2%	4.1%	25.2%	2.7%	2.6%	97.9%
Lec.Lab.Studio Enrolment			7	1274	1288	1356	4154	37	42	652	3598	738	327	13473
Others	U	Contact Hours (#)		12.0	21.0		1.0							34.0
		Contact Hours(%)		0.8%	1.4%		0.1%							2.2%
		Credit Hours (#)		12.0	21.0		1.0							34.0
		Credit Hours(%)		0.8%	1.3%		0.1%							2.1%
		Enrolment		11	19		21							51
Others Contact Hours (#)				12.0	21.0		1.0							34.0
Others Contact Hours(%)				0.8%	1.4%		0.1%							2.2%
Others Credit Hours (#)				12.0	21.0		1.0							34.0
Others Credit Hours(%)				0.8%	1.3%		0.1%							2.1%
Others Enrolment				11	19		21							51
Total Contact Hours (#)			3.0	176.0	187.5	166.5	457.5	5.0	3.0	53.0	371.5	77.0	45.0	1545.0
Total Contact Hours(%)			0.2%	11.4%	12.1%	10.8%	29.6%	0.3%	0.2%	3.4%	24.0%	5.0%	2.9%	100.0%
Total Credit Hours (#)			3.0	185.0	182.0	165.0	498.0	6.0	3.0	65.0	401.0	43.0	42.0	1593.0
Total Credit Hours(%)			0.2%	11.6%	11.4%	10.4%	31.3%	0.4%	0.2%	4.1%	25.2%	2.7%	2.6%	100.0%

Table 2.4.1.7b Data for Spring 2006 for lower level undergraduate CSLA courses. For the lower level (lower than course number 300) undergraduate courses in CSLA, 28% of Contact hours were delivered by tenure-track faculty, 69% by Lecturers, Instructors, Adjuncts and TAs with 3% unknown.

Course Type	Level	Data	Prof	Assoc Prof	Asst Prof	Lecturer	Visiting Prof	Inst	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)	97.0	124.5	101.5	345.5	3.0	44.0	336.5	71.0	39.0	1162.0
		Contact Hours(%)	8.3%	10.7%	8.7%	29.7%	0.3%	3.8%	29.0%	6.1%	3.4%	100.0%
		Credit	101.0	119.0	104.0	383.0	3.0	56.0	364.0	37.0	33.0	1200.0

		Hours (#)										
		Credit Hours(%)	8.4%	9.9%	8.7%	31.9%	0.3%	4.7%	30.3%	3.1%	2.8%	100.0%
		Enrolment	781	891	976	3303	42	584	3366	690	268	10901
Lec.Lab.Studio Contact Hours (#)			97.0	124.5	101.5	345.5	3.0	44.0	336.5	71.0	39.0	1162.0
Lec.Lab.Studio Contact Hours(%)			8.3%	10.7%	8.7%	29.7%	0.3%	3.8%	29.0%	6.1%	3.4%	100.0%
Lec.Lab.Studio Credit Hours (#)			101.0	119.0	104.0	383.0	3.0	56.0	364.0	37.0	33.0	1200.0
Lec.Lab.Studio Credit Hours(%)			8.4%	9.9%	8.7%	31.9%	0.3%	4.7%	30.3%	3.1%	2.8%	100.0%
Lec.Lab.Studio Enrolment			781	891	976	3303	42	584	3366	690	268	10901
Total Contact Hours (#)			97.0	124.5	101.5	345.5	3.0	44.0	336.5	71.0	39.0	1162.0
Total Contact Hours(%)			8.3%	10.7%	8.7%	29.7%	0.3%	3.8%	29.0%	6.1%	3.4%	100.0%
Total Credit Hours (#)			101.0	119.0	104.0	383.0	3.0	56.0	364.0	37.0	33.0	1200.0
Total Credit Hours(%)			8.4%	9.9%	8.7%	31.9%	0.3%	4.7%	30.3%	3.1%	2.8%	100.0%
Total Enrolment			781	891	976	3303	42	584	3366	690	268	10901

Table 2.4.1.7c Data for Spring 2006 for upper level undergraduate CSLA courses. For the upper level (higher than course number 300) undergraduate courses in CSLA, 55% of Contact hours were delivered by tenure-track faculty, 42% by Lecturers, Instructors, Adjuncts and TAs with 2% unknown and 1% by Research Professors and Visiting Professors.

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Resh Prof	Inst	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)	3.0	67.0	42.0	65.0	111.0	5.0	9.0	35.0	6.0	6.0	349.0
		Contact Hours(%)	0.8%	17.5 %	11.0%	17.0%	29.0%	1.3%	2.3%	9.1%	1.6%	1.6%	91.1%
		Credit Hours (#)	3.0	72.0	42.0	61.0	114.0	6.0	9.0	37.0	6.0	9.0	359.0
		Credit Hours(%)	0.8%	18.3 %	10.7%	15.5%	29.0%	1.5%	2.3%	9.4%	1.5%	2.3%	91.3%
		Enrolment	7	493	397	380	851	37	68	232	48	59	2572
Lec.Lab.Studio Contact Hours (#)			3.0	67.0	42.0	65.0	111.0	5.0	9.0	35.0	6.0	6.0	349.0
Lec.Lab.Studio Contact Hours(%)			0.8%	17.5 %	11.0%	17.0%	29.0%	1.3%	2.3%	9.1%	1.6%	1.6%	91.1%
Lec.Lab.Studio Credit Hours (#)			3.0	72.0	42.0	61.0	114.0	6.0	9.0	37.0	6.0	9.0	359.0
Lec.Lab.Studio Credit Hours(%)			0.8%	18.3 %	10.7%	15.5%	29.0%	1.5%	2.3%	9.4%	1.5%	2.3%	91.3%
Lec.Lab.Studio Enrolment			7	493	397	380	851	37	68	232	48	59	2572
Others	U	Contact Hours (#)		12.0	21.0		1.0						34.0
		Contact Hours(%)		3.1%	5.5%		0.3%						8.9%
		Credit Hours (#)		12.0	21.0		1.0						34.0
		Credit Hours(%)		3.1%	5.3%		0.3%						8.7%
		Enrolment		11	19		21						51
Others Contact Hours (#)				12.0	21.0		1.0						34.0
Others Contact Hours(%)				3.1%	5.5%		0.3%						8.9%
Others Enrolment				11	19		21						34.0
Total Contact Hours (#)			3.0	79.0	63.0	65.0	112.0	5.0	9.0	35.0	6.0	6.0	383.0
Total Contact Hours(%)		0.8%	20.6%	16.4 %	17.0%	29.2%	1.3%	2.3%	9.1%	1.6%	1.6%	100.0%	51
Total Credit Hours (#)				3.0	84.0	63.0	61.0	115.0	6.0	9.0	37.0	6.0	9.0
Total Credit Hours(%)				0.8%	21.4%	16.0%	15.5%	29.3%	1.5%	2.3%	9.4%	1.5%	2.3%
Total Enrolment				7	504	416	380	872	37	68	232	48	393.0

Table 2.4.1.7d Data for Spring 2006 for graduate CSLA courses. For the graduate courses in CSLA, 76% of Contact hours were delivered by tenure-track faculty, 16% by Lecturers, Instructors and Adjuncts with 2% unknown and 6% by Research Professors and Visiting Professors.

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Resh Prof	Inst	Adjunct	Unknown	Total
Lec.Lab.Studio	G	Contact Hours (#)	6.0	33.0	30.0	24.0	18.0	15.0	9.0	20.0	3.0	158.0
		Contact Hours(%)	1.7%	9.5%	8.7%	6.9%	5.2%	4.3%	2.6%	5.8%	0.9%	45.7%
		Credit Hours (#)	6.0	36.0	30.0	24.0	21.0	15.0	12.0	21.0	3.0	168.0
		Credit Hours(%)	1.3%	7.6%	6.4%	5.1%	4.4%	3.2%	2.5%	4.4%	0.6%	35.6%
		Enrolment	15	87	149	83	71	23	34	93	6	561
Lec.Lab.Studio Contact Hours (#)			6.0	33.0	30.0	24.0	18.0	15.0	9.0	20.0	3.0	158.0
Lec.Lab.Studio Contact Hours(%)			1.7%	9.5%	8.7%	6.9%	5.2%	4.3%	2.6%	5.8%	0.9%	45.7%
Lec.Lab.Studio Credit Hours (#)			6.0	36.0	30.0	24.0	21.0	15.0	12.0	21.0	3.0	168.0
Lec.Lab.Studio Credit Hours(%)			1.3%	7.6%	6.4%	5.1%	4.4%	3.2%	2.5%	4.4%	0.6%	35.6%
Lec.Lab.Studio Enrolment			15	87	149	83	71	23	34	93	6	561
Others	G	Contact Hours (#)	18.0	91.0	24.0	37.0		6.0	6.0	3.0	3.0	188.0
		Contact Hours(%)	5.2%	26.3%	6.9%	10.7%		1.7%	1.7%	0.9%	0.9%	54.3%
		Credit Hours (#)	33.0	142.0	30.0	63.0		15.0	15.0	3.0	3.0	304.0
		Credit Hours(%)	7.0%	30.1%	6.4%	13.3%		3.2%	3.2%	0.6%	0.6%	64.4%
		Enrolment	9	73	16	29		5	2	1	1	136
Others Contact Hours (#)			18.0	91.0	24.0	37.0		6.0	6.0	3.0	3.0	188.0
Others Contact Hours(%)			5.2%	26.3%	6.9%	10.7%		1.7%	1.7%	0.9%	0.9%	54.3%
Others Credit Hours (#)			33.0	142.0	30.0	63.0		15.0	15.0	3.0	3.0	304.0
Others Credit Hours(%)			7.0%	30.1%	6.4%	13.3%		3.2%	3.2%	0.6%	0.6%	64.4%
Others Enrolment			9	73	16	29		5	2	1	1	136
Total Contact Hours (#)			24.0	124.0	54.0	61.0	18.0	21.0	15.0	23.0	6.0	346.0
Total Contact Hours(%)			6.9%	35.8%	15.6%	17.6%	5.2%	6.1%	4.3%	6.6%	1.7%	100.0%
Total Credit Hours (#)			39.0	178.0	60.0	87.0	21.0	30.0	27.0	24.0	6.0	472.0
Total Credit Hours(%)			8.3%	37.7%	12.7%	18.4%	4.4%	6.4%	5.7%	5.1%	1.3%	100.0%
Total Enrolment			24	160	165	112	71	28	36	94	7	697

Table 2.4.1.7e Data for Spring 2006 for all CSLA courses. For all courses in CSLA, 35% of Contact hours were delivered by tenure-track faculty, 62% by Lecturers, Instructors, Adjuncts and TAs with 2% unknown and 2% by Research Professors and Visiting Professors.

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Resh Prof	Visiting Prof	Inst	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)	3.0	164.0	166.5	166.5	456.5	5.0	3.0	53.0	371.5	77.0	45.0	1511.0
		Contact Hours(%)	0.2%	8.7%	8.8%	8.8%	24.1%	0.3%	0.2%	2.8%	19.6%	4.1%	2.4%	79.9%
		Credit Hours (#)	3.0	173.0	161.0	165.0	497.0	6.0	3.0	65.0	401.0	43.0	42.0	1559.0
		Credit Hours(%)	0.1%	8.4%	7.8%	8.0%	24.1%	0.3%	0.1%	3.1%	19.4%	2.1%	2.0%	75.5%
		Enrolment	7	1274	1288	1356	4154	37	42	652	3598	738	327	13473
	G	Contact Hours (#)	6.0	33.0	30.0	24.0	18.0	15.0		9.0	20.0		3.0	158.0

		Contact Hours(%)	0.3%	1.7%	1.6%	1.3%	1.0%	0.8%		0.5%	1.1%		0.2%	8.4%
		Credit Hours (#)	6.0	36.0	30.0	24.0	21.0	15.0		12.0	21.0		3.0	168.0
		Credit Hours(%)	0.3%	1.7%	1.5%	1.2%	1.0%	0.7%		0.6%	1.0%		0.1%	8.1%
		Enrolment	15	87	149	83	71	23		34	93		6	561
Lec.Lab.Studio Contact Hours (#)			9.0	197.0	196.5	190.5	474.5	20.0	3.0	62.0	391.5	77.0	48.0	1669.0
Lec.Lab.Studio Contact Hours(%)			0.5%	10.4%	10.4%	10.1%	25.1%	1.1%	0.2%	3.3%	20.7%	4.1%	2.5%	88.3%
Lec.Lab.Studio Credit Hours (#)			9.0	209.0	191.0	189.0	518.0	21.0	3.0	77.0	422.0	43.0	45.0	1727.0
Lec.Lab.Studio Credit Hours(%)			0.4%	10.1%	9.2%	9.2%	25.1%	1.0%	0.1%	3.7%	20.4%	2.1%	2.2%	83.6%
Lec.Lab.Studio Enrolment			22	1361	1437	1439	4225	60	42	686	3691	738	333	14034
Others	U	Contact Hours (#)		12.0	21.0		1.0							34.0
		Contact Hours(%)		0.6%	1.1%		0.1%							1.8%
		Credit Hours (#)		12.0	21.0		1.0							34.0
		Credit Hours(%)		0.6%	1.0%		0.0%							1.6%
		Enrolment		11	19		21							51
	G	Contact Hours (#)	18.0	91.0	24.0	37.0		6.0		6.0	3.0		3.0	188.0
		Contact Hours(%)	1.0%	4.8%	1.3%	2.0%		0.3%		0.3%	0.2%		0.2%	9.9%
		Credit Hours (#)	33.0	142.0	30.0	63.0		15.0		15.0	3.0		3.0	304.0

Table 2.4.1.8 shows the CSLA budget for adjunct faculty for the past 5 years. We note that in Fiscal 2005, the Policy Science Group and its affiliated courses were transferred from the Humanities Department and placed in Chemistry. This accounts for the commensurate fluctuations in these expenditures. Also, The History Department historically did not need adjuncts. However, in Fiscal 2004 they accepted the responsibility of teaching all HSS213 sections. At the same time, they suffered significant faculty attrition, which led to the need for adjuncts

Table 2.4.1.8 CSLA Adjunct Budgets					
	F'02	F'03	F'04	F'05	F'06
Math	259794	276231	274951	223543	235736
Chem	86712	82377	41999	142544	148059
Phys	30963	31597	54719	54098	54151
Hum	246016	220102	157020	122954	151710
Hist	0	0	0	22334	20670
CSLA	**623485**	**610307**	**528689**	**565473**	**610326**

The delivery of curriculum in terms of staffing is being examined by the chairs and the Dean to find new and more efficient ways to design and deliver our courses while enhancing academic quality at the same time. For example, one important goal for us is to increase faculty-student contact in the classroom. We also need to respond to significant factors affecting the university and the College including:

- Our desire to expand tenure/tenure-track faculty presence in our undergraduate courses, particularly the GUR. We note that 23% of our

undergraduate lectures and 11% of our graduate course lectures in Fall 2005 were taught by adjunct faculty. Clearly this can be accomplished by the allocation of adequate resources, i.e., additional full time faculty.

- The growing student population in developmental courses;
- The growth in CSLA program-related enrollment;
- The increase in faculty release-time from teaching due to our success in funded-research; and
- The constraints on adjunct funding, if any.

The immediate considerations relating to our capacity to deliver the curriculum require the following:

- A review of teaching assignments of all tenured/tenure-track faculty, lecturers, and teaching assistants should be performed, and
- A determination of whether all assignments are consistent with the overall contributions of each individual or if any changes are required.

As the load of our faculty members is consistent with the spirit of university goal of three courses per-year per-faculty member (actually slightly higher for Fall 05), most likely the end result is some redistribution of teaching load for individual faculty members based on the criteria established in the *Faculty Plan.*

We note that the Fall 2005 semester faculty load has been slightly over 5 hours per tenure track faculty member, which would indicate an annual average load of about 10+ hours. Tenure track faculty teach 35% of the total (non-lab) teaching in CSLA. We have about 75% of faculty load in lower level undergraduate courses (basically the GURs). We note that for upper level undergraduate and graduate courses tenure track faculty teach 50% and 66% respectively of these in CSLA.

There are two additional possibilities to expand tenure/tenure-track faculty presence in our undergraduate courses: 1) increase class size, an undesirable option, and 2) consider expanding the lecture-recitation format in some disciplines where this may be suitable. It is both pedagogically unsound and maybe physically impossible to increase class size in most CSLA courses. Most of our sections already run with 30+ students. As we have the primary responsibility for teaching the fundamental GUR courses for students in all majors and the developmental courses for under-prepared students, it will certainly be counterproductive to further increase class sizes in CSLA. Furthermore, the current infrastructure does not allow class size to change significantly due to room capacity (this issue is addressed later in the document).

Regarding the enrollment increase in our courses for under-prepared students, it is important that the needs of these students be met so they can succeed in their academic careers at NJIT. Evidence of the marked increase is presented in Table 2.4.1.9.

Table 2.4.1.9 For CSLA's remedial courses, we present the growth in enrollment in these courses from Fall '04 to Fall '05 and the consequent increase in the number of sections required to provide for this growth. While we have run these remedial programs for a number of years, in the past several years that the number of sections and students in these courses has grown quite rapidly.

Table 2.4.1.9

Year	Math 098	Math 103	Math 104	HSS 099	HSS 100	Total	Sections for academic year
Fall 04	68	285	206	200	12	771	62
Fall 05	129	408	196	298	20	1051	83

It is past due that we should undertake to perform a comprehensive assessment for these programs. Such an assessment must include a study of how well students who have gone through these courses perform in later years as well as their retention data. We will make use of assessment strategies that have been created and expertise that CSLA individuals have developed to develop an assessment process for these courses but it is very important that we also invite external experts on a cyclical basis to examine our efforts in these initiatives as also to make recommendations for improvements.

2.4.2 Longitudinal perspective [How have offerings changed?]

We have in place the mechanisms to revise our programs and methods of delivery as the need arises, but our mission of educating students in foundational core areas will always be at the heart of an NJIT education and a CSLA education.

The course offerings of CSLA can be grouped into three main categories:

1. GUR courses
2. Service courses mainly for students in non-CSLA majors
3. Courses mainly for CSLA majors (may also be taken by other majors as electives)

As far as the GUR courses are concerned, the offerings do not change with changing enrollment patterns for the university, only the number of sections within a subset of the GUR might need to be revised in light of enrollment changes. If the overall university enrollment changes significantly in terms of quantity and quality (growth or decline), then the change in GUR pattern and number would be become necessary. Developmental courses for underprepared students can be placed in this category. The number of sections of these courses has been growing, but the types of offerings need not be revised (See table 2.4.1.9 above).

With respect to offerings mainly directed at CSLA majors, we note that CSLA is steadily growing in terms of the number of students pursuing degrees in our programs. Later in this report we demonstrate the enrollment growth of 32% over the past 3 years in the number of undergraduate CSLA majors and the 46% growth over two years in the number of enrolling CSLA freshmen (see section

5.1). We are regularly expanding our offerings in light of both our growth in number of students as well as with respect to the focuses of our programs, especially with the revisions of our degree options and the enrollment growth in our majors, particularly in biology and bio-related aspects of other CSLA majors.

In addition, CSLA is working to increase its cross-disciplinary offerings in accordance with our strongly held belief that the greatest advances in our society will come from teams of people with different but complementary skills and knowledge working together. Another direction CSLA will pursue will be in strengthening the relationship we have with industry. With the help of the members of our advisory board we will pursue an increased industrial focus that will help us gear our programs to the needs of the economy and make the education we offer most relevant to our students.

2.4.3 Pedagogy [How will courses be offered and by whom]

In the Fall 2005 semester, CSLA offered 550 sections with over 12,000 students enrolled. Our tenure track faculty of roughly 100 dedicated professors clearly cannot handle this load on its own and thus we require lecturers, TAs and adjuncts to accomplish our teaching mission.

We have made it our policy to stress student learning in determination of staff assignment, instructional mode, and class size. Although class size has been going up considerably in the last few years, we have worked hard to continue to provide reasonably small classes for those in developmental writing courses and have modest class sizes to foster interactions between students and faculty in our courses.

We recognize that technological advances can be employed to enhance teaching and learning. We address this issue at greater length in section 1) e. ii. We note however, that we expect the *standard* Lecture and Lab frameworks to continue to be the mainstays of CSLA course delivery for the foreseeable future.

2.4.3.1 On campus

Nearly the entire inventory of CSLA course offerings takes place on campus. These are almost entirely (with some exceptions noted in the following 2 subsections) conducted in the traditional lecture or lab format. Other aspects of on campus classes and teaching services include recitation classes, learning center hours, courses that incorporate technology or combine lecture and lab in a single class.

2.4.3.2 DL

None of CSLA's programs are offered completely through Distance Learning, although some of our courses are made available in this mode to support degrees offered by other colleges (i.e., CCS). These are offered mostly in humanities, social sciences, and mathematics. Both DL students and traditional students avail themselves of these offerings. Although there

are no plans to offer CSLA degrees via DL we are very interested in exploring and have been pioneers in using technology in the classroom both to augment the traditional instruction as well as to improve student/teacher attraction. In particular, the issue of Blended Learning is addressed in section 2.9.3.

2.4.3.3 Off campus

There are some humanities courses, in particular HUM 101 and ENG 352, offered at high school locations. Other courses currently offered off campus are those in the environmental policy program. These courses are offered at EPA. Clearly, this is an area where we must examine the possibility for additional growth. In the past, NJIT was a leader in this state in providing off campus instruction at corporate sites and other colleges/universities. We have already begun to work with a select set of state colleges to establish BS/MS articulation agreements in NJIT strength areas where state colleges lack presence (by working closely with Continuing Professional Development and Graduate Admissions).

2.5 Assessment and continuous improvement [In conjunction with IRP]

Most academics would argue that the ideal purpose of their teaching is to foster a critical appreciation of ideas, creativity and independence of thought. But lecturing alone will not encourage such higher learning dispositions; the design and use of sound assessment techniques play an important role in creating the ideal learning environment. Assessment is an ongoing process of gathering, analyzing and reflecting on evidence to make informed and consistent judgments about student learning and to also improve it. Information from assessment is helpful to understand student learning and to support students' progress towards achieving their learning objectives by providing them with regular and constructive feedback. Effective assessment practices involve a range of measures and provide students with opportunities to demonstrate their knowledge and skills. Assessment practices should be valid, reliable, and fair. Assessment is especially relevant with learning approaches that emphasize the fact that individuals perceive and process information in very different ways. This necessitates various ways to assess how well students are learning the material and so the feedback given is not so much a formal grade as self-assessment and monitoring of learning progress. The assessment information should also be used to improve curricula and pedagogy.

Assessment is even more relevant with instructional technology. Simply using instructional technology does not guarantee successful student learning or better educational outcomes. Instead, we must consider how instructional technology relates to teaching and learning. Using instructional technology requires systematic and thorough planning prior to implementation. Once implemented, there must be a periodic evaluation of the effectiveness of using the technology by systematically assessing its effectiveness in support of instruction. NJIT has traditionally employed student evaluations to assess course and instructor

performance. Similarly, students' performance is measured using the traditional means of exams, homework, projects, etc. to assess their mastery of course material. It is important that a more comprehensive system to perform a rigorous analysis of the teaching and learning environment be considered for assessment. The results of this will be valuable in evaluating the curriculum, teaching methods, and learning outcomes, which will enable us to improve student success as well as provide us with a structure for ongoing curriculum review.

Assessment is now an important area for the accreditation agencies under which programs in architecture, computing, engineering, management are considered. The Middle States Association of Colleges and Schools also appreciates the importance of assessment. Although CSLA's programs are not externally reviewed, with respect to assessment, CSLA is placing increasing emphasis on assessment at all levels of education.

2.5.1 Internal Assessment

Internal assessment, as noted above, has for many years focused mainly on student evaluations. While these serve a useful purpose, an assessment program from which more extensive aspects of our programs can be evaluated is needed. Through thorough, well planned assessment methods, we will be able to determine the effects of our current methods of curriculum delivery as well as the effects of revisions made. Assessment methods will in part be developed based on specific questions we can ask now, as well as in order to have data we feel might be useful for future analysis.

Specific questions addressed by the current evaluation methods include opinions of students concerning texts and other course materials, availability and clarity of the professor and impressions of the course. The responses to the questions on the evaluation, not surprisingly, can help guide selection of course materials and pinpoint areas in which faculty might improve some aspects of performance in the classroom. These are worthwhile things to learn, but there is much more we need to learn and there are "larger" issues to focus on with respect to evaluation.

It is becoming clear that we need to evaluate how effectively we are educating our students in terms of producing graduates who are able to think critically and communicate effectively. NJIT graduates should also be proficient in skills particular to their discipline of study.

CSLA will develop strategies to address such important issues.

2.5.1.1 Student learning outcomes [Assessment and improvement]

We are working with the Institutional Research and Planning Office to develop strategies for improving our assessment methods. These will include, but not be limited to the following:

- Student portfolios – Collections of student work through their years at NJIT to be able to evaluate growth in students' skills in their discipline and in communication ability. While not all questions we hope to ask

have been considered at this time, it is hoped that by collecting portfolios, we will be able to address arising issues longitudinally.

- Collection of low, average, and high quality course work which can be used to assess how well the programs are educating students and whether our goals are being met.
- Principles and skills from top down and bottom up – The identification of a clear record of general and focused listing of the skills we want our students to master and knowledge to acquire, at all levels of their education should be created. So to each degree program, year, and, furthermore each course, a discussion of which skills and knowledge are addressed and how can take a place. This exercise would provide the basis for determining how the different pieces of education fit into a logical educational plan for every student.

2.5.1.2 Program and curriculum efficiency [Grad. & retention]

While the points in the above subsection will also be used to evaluate the effectiveness of our curriculum delivery, other methods will be applied to keep our programs up to date and to have best practices incorporated quickly into our efforts.

Toward this goal, CSLA plans to "close the loop" in propagating good teaching and curriculum principles into our courses. We will encourage the faculty to become active in NJIT's Teaching and Learning Day, an event that will bring together the best ideas from our faculty and students each year. The portfolios produced by students (reflecting the range from low to high quality work) will be kept to provide a longitudinal view.

Finally, CSLA will continue to promote and pilot ideas for effective teaching such as team teaching efforts (possibly even across disciplines) and the integration of disciplines (writing being incorporated more systematically into science courses).

More on strengthening faculty teaching skills and the NJIT learning environment are addressed in the next section.

2.5.2 Continuous improvement in faculty skills and learning environment

CSLA takes great pride in the excellence of our teaching staff, who embrace the highest standards of scholarship and academic excellence. Excellence in scholarship informs our educational programs. Our faculty not only explores the frontiers of knowledge, but they also integrate ideas, connect thought to action, and inspire students. CSLA desires to foster a love of learning and an inquiring mind in each of its students. An enthusiastic learner is one who will challenge accepted wisdom, engage in intellectual pursuits, aspire to excellence and be committed to life long learning. This love of learning can be facilitated through the development of a culture that promotes more faculty-student and student-student interaction. Inculcating a love of learning in our students will enable NJIT

to fulfill its obligation to produce graduates who are able to make positive contributions in the communities in which they will live and work. We will further develop our strategies to systematically improve the quality of teaching and learning. We will also provide support and rewards to our teaching staff to encourage improvements in learning and teaching.

Learning Styles vs. Teaching Styles

A lot of attention has been given in recent years to student learning styles, how they may differ from faculty teaching styles, and what to do about such differences. With an NJIT stated mission underscoring student-centeredness, understanding how learning and teaching styles influence student learning is important. Research has demonstrated, for example, that the relationship between teaching and learning style is a factor in the success of students. Identifying, then, the modes in which students learn best becomes useful in helping students understand and become aware of how they learn and study best and also in helping instructors select and design teaching strategies that maximize student learning and understanding. Naturally, addressing the diverse learning needs of students adds to the challenge of teaching but accounting for differences has the potential to help students succeed and instructors improve their course design and delivery. Thus, our overall curriculum delivery methods will take into account student learning orientations. NJIT has already taken steps to recognize teaching excellence. The Master Teacher group can be particularly helpful in taking a lead toward defining high quality teaching and learning and helping us further teaching and learning excellence at NJIT.

Instructional Technology

In addition to the fact that students learn in different ways, they often come into our courses with different backgrounds and levels of preparedness. There is ample evidence that the use of instructional technology as a tool for supporting instruction can be effective in increasing the quality of the teaching and learning. It can also be used to provide targeted, self-paced instruction to remedy deficiencies or inequities by making many types and levels of material available to students in different forms, allowing them to engage with course content, supplementary material, or pre-requisite knowledge, at their own pace and in the medium that suits them best.

There are also unlimited possibilities for using the web in our instruction. We need to follow suit as many other top universities have done and improve the learning environment by establishing a short term goal and a deadline for ourselves to place content and learning aids for all our courses on the web, in addition to the syllabi and other related material. Each syllabus should have a section clearly identifying how the course addresses relevant program learning goals, college learning goals and university learning goals. It is important to note that one can use and build upon what others have developed, making this goal

quickly attainable. The content of a complete, modern curriculum can be collaboratively developed by integrating the good work of experts in the field. This allows for course material to be much better organized. Students will have easy access to information and timely interaction with their instructors and peers. Of course, copyrights and intellectual property laws need to be observed.

Adequate resources and support for faculty development will be important to succeed in creating a sound technology-supported learning environment which will be facilitated by the development of appropriate strategies and incentives to support this initiative. There will also be a need to review the progress and quality of the use of instructional technology to achieve better learning outcomes. Processes to evaluate the continuing development of new technologies and to make timely recommendations to adopt or reject new technologies will also be needed. The guiding principle must be that the new technologies must enhance learning. Technological developments must be approached carefully, taking into account how to most positively influence learning and not jumping into new technology for the sake of using new technologies. As New Jersey's Science and Technology University, NJIT is well positioned to make rational, well informed decisions in this realm. This will be accomplished by adopting best practices related to instruction, technology use and assessment.

2.5.3 External (accreditation, program reviews)

Unlike the programs in the School of Architecture, the College of Computing Sciences, the Newark College of Engineering, and the School of Management, the programs of CSLA are not externally evaluated but we have adopted internal evaluation mechanisms in place through IRP. However, as already noted above, we intend to focus more attention on program assessment. Toward this effort, we participated in a Middle States workshop in January 2006 to plan for this work. We will also work with NJIT's internal assessment experts in IRP as well as CSLA faculty with expertise and experience in assessment (particularly in the Department of Humanities), and who work with IRP personnel on assessment research.

2.6 Participation in Honors College [IRP data provided]

2.6.1 Students

CSLA has always worked well with the Albert Dorman Honors College (ADHC). In fact, CSLA is proud to have been the place of the honors college has taken routes for many years before it was launched as an independent unit at NJIT. Examples include the 1996-1999 NASA Student Launch Program Grant with Math Sciences faculty as PI and ADHC students building an apparatus that was launched on a NASA balloon. CSLA faculty and administration continue to work closely with the ADHC to identify opportunities for collaborations (the NSF scholarship proposal being developed now in conjunction with the ADHC is an example).

We present, in Table 2.6.1.1 the number of Honors students majoring in CSLA disciplines over the past 5 years. We also present the percentage of CSLA students who are in Honors and compare with the percentage of NJIT students who are in ADHC.

Table 2.6.1.1 CSLA Honors Enrollment

F2001-F2005 CSLA Honors Enrollment by Program

	F2001		F2002		F2003		F2004		F2005	
	Honors	All UG	Honors	All UG	Honors	All UG	Honors	All UG	Honors	All UG
CSLA Total	43	261	43	228	54	256	69	287	81	332
NJIT Total	545	5,698	527	5,730	521	5,712	508	5,366	581	5,263
CSLA as % of Honors and CSLA as % of NJIT	7.9%	4.6%	8.2%	4.0%	10.4%	4.5%	13.6%	5.3%	13.9%	6.3%
Honors as % of CSLA and Honors as % Of NJIT	16.5%	9.6%	18.9%	9.2%	21.1%	9.1%	24.0%	9.5%	24.4%	11.0%

From the table, it is clear that ADHC students make up a much larger and growing percentage of CSLA than they do of NJIT undergraduates as a whole and that CSLA students make up a larger percentage of ADHC students than the percentage of NJIT undergraduates that are CSLA majors. CSLA undergrads as a percentage of the Honors program has grown from 7.9% to 13.9% from 2001 to 2005. This is consistently higher than the percentage of CSLA students at NJIT (5.4% in 2001; 6.3% in 2005). Similarly, nearly one in four of CSLA's students are students in ADHC (vs. 1 in 6 in 2001), while only about one in ten NJIT undergrads is in ADHC.

2.6.2 Courses

CSLA offers honors sections of numerous courses at all levels and in all our departments. These sections offer more challenge and have more extensive content or present material in greater depth than the regular sections of these courses.

Table 2.6.2.1 CSLA Honors Courses

Department	Chemistry and Environmental Science	History	Humanities	Mathematical Sciences	Physics
Honors Courses	CHEM 124 CHEM 125 CHEM 126 CHEM 243 CHEM 244	HIST 125 HIST 213 HIST 379 HIST 383	HSS 101 HSS 202 HSS 211 HSS 212 HSS 491 STS 310 STS 312 STS 360 STS 380	MATH 111 MATH 112 MATH 213 MATH 222 MATH 226 MATH 331 MATH 333 MATH 337 MATH 340 MATH 440 MATH 450 MATH 451	PHYS 111 PHYS 111A PHYS 121 PHYS 121A PHYS 231

2.7 Educational research or innovation efforts [Department initiated projects]

CSLA unites education and research in many ways. We list in this section some of the ways that CSLA faculty are bringing their research to undergraduate students and fostering an appreciation for the scientific endeavor among students. We also list efforts in CSLA to understand how learning can be measured, i.e. research on teaching and learning.

- Research by Humanities faculty with Institutional Research and Planning and Educational Testing Service (ETS) concerning measurement of student performance in critical thinking areas.
- The NSF Undergraduate Biology and Mathematics Training Program, trains undergraduate students and provides research opportunities for them at the nexus of Biology and Mathematical Sciences.
- Through an NSF grant that supports the Applied Mathematics capstone lab, NJIT researchers will investigate the influence of performing physical experiments in mathematics classes on student motivation to perform research and on student performance.
- Education grants – CSLA is making significant efforts toward obtaining education-related grants, with personal engagement from the Dean, who has experience and interest in teaching and learning issues. In particular,
    - An application for a STEP expansion grant has been submitted to NSF. This program seeks to increase the number of US citizens/residents earning degrees in STEM fields.
    - With ADHC, a grant proposal is under preparation for the NSF S-STEM program. This program provides scholarships for students pursuing STEM degrees.
    - A proposal is being prepared to obtain NSF funding for NJIT to host an Undergraduate Research Experience for students in the chemical sciences.

- With Rutgers-Newark, the Newark Museum and the Newark Public Schools, we are preparing an NSF proposal for scholarships for students pursuing STEM degrees with the goal of teaching in urban school districts.

- With the authorization from the State of New Jersey, CSLA has established a teacher certification program (in cooperation with Rutgers-Newark). We intend to expand our focus to include computing, engineering, and other disciplines in this effort as well.

2.8 Participation in university service: EOP and faculty diversity [IRP data]

Educational Opportunity Program - CSLA is an active participant in the Educational Opportunity Program at NJIT. This has enabled us to attract promising students, who with the support of EOP and CSLA, have success in completing their undergraduate degrees. There are currently 35 EOP students studying for CSLA degrees or 10.5% of CSLA students. This is just about the same as the overall percentage of NJIT undergraduates who are in EOP (10.4%). Data for EOP students in CSLA and NJIT as well as total CSLA and NJIT enrollment is provided in Table 2.8.1. Over the past 5 years, the CSLA participation in EOP and the EOP participation in CSLA has been similar to slightly higher than at NJIT as a whole.

Table 2.8.1 CSLA EOP Enrollment

F2001-F2005 CSLA EOP Enrollment by Program

	F2001		F2002		F2003		F2004		F2005	
	EOP	All Under	EOP	All Under	EOP	All Under	EOP	All Under	EOP	All Under
CSLA Total	28	261	24	228	33	256	33	287	35	332
NJIT Total	585	5,698	572	5,730	550	5,712	535	5,366	549	5,263
CSLA as % of EOP and CSLA as % of NJIT	4.8%	4.6%	4.2%	4.0%	6.0%	4.5%	6.2%	5.3%	6.4%	6.3%
EOP as % of CSLA and EOP as % Of NJIT	10.7%	10.3%	10.5%	10.0%	12.9%	9.6%	11.5%	10.0%	10.5%	10.4%

Faculty Diversity – CSLA is working to achieve faculty diversity by actively soliciting applications from candidates with diverse demographic backgrounds. We emphasize recruiting and retaining women and members of traditionally underrepresented ethnic and racial minorities. Because our faculty members come from many different backgrounds, they have diverse viewpoints and represent a broad array of cultural practices.

We present Table 2.8.2, providing data concerning the diversity of CSLA faculty and that of NJIT as a whole. The diversity of CSLA's faculty is similar to that of NJIT.

Table 2.8.2 Diversity of CSLA Tenure-Track Faculty (%)

	Female	Hispanic	Black	Asian	International
NJIT	13.1	1.3	3.3	18.7	7.5
CSLA	14.3	2.0	2.0	16.3	5.1

2.9 Future plans [Include goals for the change]

2.9.1 New programs

In the last few years, we have strived to have the flexibility required to respond to changing times and make our course offerings relevant to the students of New Jersey, the region, the country and, indeed, internationally. In this regard, we have revised existing programs and added/strengthened options in our programs. Specifically, our concentrations at the intersection of biology and the rest of the scientific disciplines, such as Mathematical Biology, Biochemistry, and Biophysics concentrations, the joint NJIT-UMDNJ BS/Doctorate in Physical Therapy and BS/MS in Physician Assistant are examples of such efforts. In addition, we continue to develop and strengthen the initiative to improve the attractiveness of our pre-professional programs: pre-medical/pre-dental/pre-law/pre-optometry options in all our majors, and the recently state-authorized teacher certification program (in biology, chemistry, English, history, mathematics, physics, and science/technology/society, in collaboration with Rutgers-Newark. This last program is expected to become a major growth focus of our near term efforts both for CSLA and the remaining majors at NJIT.

Further examples of revised program on the liberal arts side are the major revision of the Professional and Technical Communication degree and its migration to a Communication program with a set of specializations in PTC, media art, and literature (more below on the next phase of this transformation of our PTC program); and the exclusive focusing in history on the NJIT relevant concentrations of history of the environment, health and medicine, and communication.

Possible New Programs in the Sciences

We are also currently investigating the feasibility of offering additional degrees in the area of computational and health sciences. As the Master degree in Computational Biology will be re-placed under the purview of CSLA in the near future, we have begun to examine the possibility of expanding this computational program to make it available to undergraduates in other science disciplines in addition to biology. This can be done initially by offering new undergraduate concentrations in existing programs and then spinning them off into separate degrees if student interests warrant it. These options would be attractive to students who are interested in computing in the context of a specific science

discipline. Offering additional undergraduate concentrations in computational biology, chemistry, and physics would initially involve modest investments instructional cost and laboratories as it would combine CSLA existing strengths in mathematics and the sciences with CCS strengths in computing. The future needs can be assessed depending on the level of student interests in these new options.

Computational Biology/Chemistry/Physics

Computational biology combines aspects of the disciplines of biology, mathematics, and computing science. Computational biologists work to understand, model and analyze the vast quantities of data that modern biological techniques produce. Examples include genome studies and advanced models for disease spread and bioterrorism. The skills mastered in earning a degree in computational biology lead to a better understanding of the natural world and would be of value in careers natural resource management, health care, and pharmaceuticals.

A degree in chemistry with a concentration in *computational chemistry* combines aspects of the disciplines of chemistry, mathematics, and computing sciences. Computational chemists work to understand, model and analyze chemical structures and the behavior of chemical compounds. Examples include modeling the dynamics of pharmaceutical products in the human body or predicting the behavior of yet to be produced chemical compounds, drug design. The skills mastered in earning a degree in chemistry with a concentration in computational chemistry could make a student valuable to pharmaceutical and chemical companies.

Computational Physicists combine aspects of the disciplines of physics, mathematics and computing sciences to solve complex computational problem using high-performance computers in areas like design of material, weather prediction, medical technology, and environmental cleanup. A degree in physics with a concentration in *computational physics* provides the students with the understanding of algorithm design, simulation techniques and scientific insights necessary for working with high-performance and parallel computers in such areas as oceanography, material science, computer science, medicine, energy, aerospace, chemical or pharmaceutical companies.

Health Sciences

Another possibility for an undergraduate degree is in *health sciences*. With the expansion of the biological theme in CSLA's undergraduate programs, and with the DPT and Physician Assistant collaborations with UMDNJ noted earlier in this document, it is natural to consider widening such opportunities to include additional health professions. The health sciences degree would be a four year undergraduate program. The curriculum would include a component of liberal arts courses as an important aspect of professions for which this degree provides

training often involve working closely with health care providers and patients. Naturally, program options will also require strong a scientific component, a strength that CSLA can certainly provide. This program would train students for positions in both clinical and non-clinical healthcare. The proximity of UMDNJ and close connections we have developed with UMDNJ would strengthen such program. It is important to note that such a program will require upfront investment in terms of faculty and facilities and thus careful planning is needed before any serious commitment is made.

Possible Further Enhancement to the Communication Program: Strengthening the Humanities and Technology Link

We believe that there is an opportunity for CSLA to expand its presence in the liberal arts and increase the number of students choosing to major in these areas at NJIT. This will only be done in areas where there is clear synergy between our technological strength and the possible new areas. As we have done in creating the pre-professional programs and the new teacher education option, careful attention will be given to optimal use of existing resources. Here, too we can capitalize on our existing strengths.

Journalism

A new journalism concentration in the Communication program that joins traditional journalistic skills with NJIT's established strengths in technology has just been finalized. The goal is to train graduates who can write, report, and edit news while demonstrating superior understanding of the power and potential of new media. At the core of this concentration is a sequence of four courses. The basic one, which already exists, is Practical Journalism. The course teaches basic skills of news-judgment, reporting, writing and journalism ethics. It has been offered for a number of years, but this semester enrollment is more than double that of past years. The three other courses are new. Online Journalism, offered for the first time this semester, explores how news is covered on the Web and compares coverage to that of print and television. The class also analyzes coverage of breaking news events "live" (online) from the classroom. There is also Advanced Journalism, to be offered for the first time in the Fall '06. This course will build and expand on the basic skills learned in Practical Journalism. The third new course is Television News Writing and Production. The purpose of this course is to teach students how to write and produce a newscast by having them write and produce a newscast at NJIT that will be made accessible through the university's cable television system.

One key to success is informing high school students, teachers, and guidance counselors that NJIT, New Jersey's Science and Technology University, indeed has a journalism program -- one that is distinctive precisely because of its technology context. So, with that in mind, this summer we will be conducting a

journalism workshop for high school students that will expose attendees to journalism at NJIT and to the institution as a whole.

Theatre and Technology

The Communication program already makes great use of its relationship with the joint NJIT/Rutgers-Newark's Theatre Arts program. Students are able to take courses at both universities. Existing NJIT courses, such as Living Theatre, allow students to learn the elements of stage presentation (acting, design, theatre history, and lighting and other technologies using the resources of the NJIT and Rutgers-Newark theatres) and American Musical Theatre, covers the development of American Musical Theatre decade by decade, starting with the turn of the 20th century until the present day. NJIT Communication students with interests in the use of technology in theatre production can select from a larger set of Rutgers-Newark courses to complete their concentration in Theatre and Technology covering production, theatre technology, scenic art and lighting, stage management, and theatrical design.

Music and Technology

The Communication program can also be responsive to the interest of undergraduates in electronic music. One recent example is the incorporation of synthesized sounds in the latest NJIT production, *The Ghosts of Rowan Oak*, which utilized equipment and software housed in the Humanities Department. As a result, and in collaboration with both the Information Technology Program's Multimedia concentration and the existing NJIT-Rutgers Theatre Arts Program, we intend to expand the existing collection of music and technology courses. The Humanities Department has, as part of its instructional staff, significant strength in music – its history, genres, composition, and production. The existing STS music courses, such as Music and Technology, examine the ways music has been affected by technology from the nineteenth to twenty-first centuries and provides both theoretical and practical components. In addition to the history of technology's transformation of music, the course examines the basics of digital sampling, recording, sequencing, and mastering software. In Advanced Music and Technology students learn the basics of notebook computer-based music composition and production, with an emphasis on composition and making of music, and learning the aesthetics necessary to get the most out of a machine. Additional courses in electronic music composition, electronic sound synthesis, and sound recording technology will be created to offer a complete concentration in Music Production.

Law and Technology

The History Department, in cooperation with the STS program, already offers a popular minor in Legal Studies, and many History and STS students elect to pursue degrees in Law. We see an opportunity to expand on this. New

technologies provide benefits to society but also have the potential to cause harm. And thus, often, stimulate changes in the law. Technological advances create the need for technically trained people in many disciplines, including lawyers. In some areas of law, students with strong technical background can be at a distinct advantage in terms securing entry into law schools as well as finding rewarding careers where law and technology meet. For example, intellectual property law ensures rights and protection for technological innovations, environmental law specifies methods for dealing with hazardous material, and telecommunications law regulates access to radio frequencies for satellites. Law schools do not stipulate that undergraduate students complete any particular major, but pursuing a concentration in Law and Technology, students gain an exposure to the kinds of issues that law students study at the same time as they learn about technology and its impact on society. Some courses within the concentration will help students learn about the nature and function of law in society, understand the role of courts, and the rights and liberties of individuals. Other courses may cover cyberlaw and policy, legal regulation of the environment and intellectual property law, and illustrate how legal institutions regulate technology and resolve conflicts that arise from the use of technology. The Law and Technology concentration will also will include course that provides exposure to reading, writing and oral communication - skills that law students and lawyers need.

Other possible multi-disciplinary options being explored involving Humanities are a masters HCI (Human Computer Interaction) degree with the Information Systems Department and a Masters degree in Management Communication with School of Management.

Distributed Faculty of Social Sciences

Background

The social sciences are important to the advancement of NJIT as a science and technology university because they serve to situate scientific and technological advancements within the wider societal framework. The social sciences are concerned with human behavior, human interactions, human environment, and related social structures and forms. The social sciences are essential to an understanding of the economic, social, and political forces at work in our world. Such learning opportunities will enable our students to deepen their knowledge of human society, its traditions and institutions, and to apply that knowledge to the various personal, organizational, and societal aspects. This is becoming even more important given the on-going trend of globalization and internationalization.

The social sciences are an important component of our General University Requirements but, at this time, NJIT does not have a formal social sciences department (and has not had one for almost a decade). Both the Humanities Department and the History Department have faculty whose training and teaching/research interests are related to the social sciences. In addition, there are

faculty in various NJIT departments who hold doctoral degrees in social science disciplines. Many of these faculty have active research programs and deliver courses that sit at the confluence of science, technology, and the social sciences. The following is a list of such individuals. The list is not exhaustive but it does serve to highlight the breadth of social science knowledge at the university. They are:

Theologos Bonitsis – Economics – School of Management
Patrick Beaton – Urban Planning – Humanities
Maurie Cohen – Regional Science – Chemistry and Environmental Science
Norbert Elliot – Social History of Writing Assessment – Humanities
Karen Frank – Environmental Psychology – School of Architecture
Roxanne Hiltz – Sociology – Information Systems
Nancy Jackson – Geography – Chemistry and Environmental Science
Zeyuan Qui – Economics – Chemistry and Environmental Science
Neil Maher – Environmental, Social, and Political History – History
Eric Katz – Environmental Ethics – Humanities
Naomi Rotter – Psychology – School of Management
Hindy Schachter – Public Administration – School of Management
Karl Schweizer– Diplomatic History, Political Science – Humanities
Richard Sher – Social History of Technology – History

There are also a number of special lecturers in the Humanities Department whose training is in the social sciences and who have taught such courses at NJIT and other universities.

Distributed Faculty of Social Sciences

The College of Science and Liberal Arts proposes to create a *Distributed Faculty of Social Sciences* reporting directly to the dean. This will be an NJIT inter-collegiate social science group with membership made up of the above named faculty (providing they agree to join) and others who may hold advanced degrees in a social science discipline or have teaching expertise/interest in such areas. The group would serve as a forum for social science activity at the university. Specific goals of the group would be to:

1. provide faculty oversight for the delivery of the social sciences component of the General University Requirements (GUR).
2. guide the development of any new social science courses for the GUR or as required/electives in the majors.
3. enhance communication among social science faculty at the university to strengthen social science practice and promote collaborative research initiatives.
4. provide a point of contact for non-social science faculty to interact with social science faculty.

In addition, there are a number of benefits to this approach. The include the promotion of integrated courses of social science with science and technology, the recapturing of tuition revenues that are currently lost to other institutions where our students take social science courses to fulfill undergraduate GUR requirements and electives, and there is also an opportunity to develop social science options in our degree programs that are not possible to build at present due to physical fragmentation of faculty resources (The National Center for Educational Statistics reported in 2003 that the second largest field of study for undergraduates is social sciences).

Clearly, social science is a field that NJIT, as a comprehensive technological university, should embrace, and this proposal enables us to take advantage of existing faculty resources with no cost to the university.

2.9.2 Curriculum revision: Building Distinctive Programs

CSLA has recently undergone major efforts to organize coherent curricula in each of our programs. As noted in section 2.1 and in the section above, we have refocused our concentrations in all of our majors on areas (and, in some cases, created new ones) consistent with our research strengths and with the needs of the State's economy. We have also renamed the Professional and Technical Communication program as Communication, allowing us to create new concentrations to meet the changing demand of this field. While this program retains aspects of its initial strength, it now has an increased emphasis on the visual design features of technical and professional communication. It also is flexible enough to allow the introduction of additional relevant concentrations. Our efforts here are already paying off with a large increase in interest in this program. The curriculum for each of our programs has been carefully thought out. However, revisions will be made as each of our academic departments undertakes a review and assessment of their programs (see section 2.5 - which details our planned assessment procedures and how what we learn will be incorporated into our programs). Some of the areas in which we expect to develop new courses are in biochemistry, biophysics, biostatistics and mathematical biology.

Capstone Experience

The idea of having all undergraduate students in CSLA complete a Senior Capstone Experience will be examined. Capstone Experiences allow each student to demonstrate the capacity to bring knowledge, skills, and ideas to bear on one significant project requiring the integration of their learning experiences, talents and capabilities and thus concluding the student's undergraduate academic experience with a significant scholarly accomplishment. Capstone options in CSLA majors would be designed by individual departments and may take many different forms, including seminars, internships, practicum, field work, independent research and other such options.

Undergraduate Research Experience

An educational model that will provide a research experience for all undergraduate students in the College of Science and Liberal Arts (CSLA) at New Jersey Institute of Technology (NJIT) is proposed. This undergraduate research experience will be central to our student's education and will enable them to fulfill their intellectual, social, and career objectives. Our students will be working side-by-side with well recognized, published researchers and learn, first-hand, through this experience. Research projects involving students will be interdisciplinary in nature, involving scientists/mentors from Biology, Chemistry, Environmental Sciences, Mathematics, Physics, and the humanities. CSLA faculty and administration will discuss the feasibility of implementing such an initiative in its curricula to make undergraduate research a strategic priority. This is not intended to be a capstone experience; it will be an option offered to students as part of their learning experience.

Excellence in education and research lies at the core of CSLA's mission. The excellent scholarly work of our faculty in the discovery and dissemination of new knowledge strengthens the educational programs and provides a distinguishing characteristic for the College. CSLA prides itself in providing a rich student-faculty interaction in both general education courses as well as major courses. This interaction can be further strengthened by embedding a formal Undergraduate Research Experience into our curriculum. Undergraduate research opportunities can support our fundamental educational objectives by providing a relevant and exciting education, exemplifying engaged pedagogy, and promoting students' intellectual independence and maturation. Our faculty also stands to benefit from these interactions and curricular reforms.

Our research capacity has grown tremendously over the last decade, and we are at the forefront of many emerging scientific developments. We have state-of-the art facilities in which to carry out our research work. Our researchers, who will serve as mentors in this proposed initiative, are internationally recognized experts in their fields. Many already have considerable experience in mentoring both graduate and undergraduate students, and have demonstrated commitment and

understanding of the definite value of research at the undergraduate level. We have also successfully mentored many undergraduate students through programs such as NSF-sponsored REU's. This year, there have been increased efforts in CSLA on seeking funding from federal agencies and private foundations to increase such opportunities.

Given this, we should consider taking the natural next step to promote undergraduate research within the curriculum with full understanding of its value to the students and the university.

Internships and Cooperative Education Experience

With CSLA's enrollment in its own majors increasing, there is a need to facilitate internships and cooperative education opportunities to enable our undergraduate students to gain practical experience. It is important that we provide educational and work experiences that are directly related to the curricula and the students' career goals. The benefits of internships and cooperative education experiences are multifaceted. Students will have an opportunity to apply principles and techniques learned in academic settings to real-world problems; will develop an understanding of employment demands, responsibilities, and opportunities; and will also gain career knowledge beneficial for continuing their formal education.

2.9.3 Pedagogy revision

We have discussed above (see section 2.5.2) some ideas concerning exploring new ways of teaching and delivering courses and programs. These include:

- Working with Master Teachers to disseminate among faculty best practices across the university and around the country.
- Increasing use of technology for education (instructional technology).

Here, we elaborate on three more pedagogical concepts

- Teaching/Research connections.
- Blended learning.
- Encouraging participation in NJIT teaching and learning day.

Teaching/Research Connections

The connection between teaching and research and the possibility for real-time transfer of research results from the laboratory into the classroom is a characteristic of NJIT. The aim should be to expand the instances in which teaching and research come together. For our faculty, their classroom teaching is shaped by their commitment to research in their discipline. But positive teaching/research connections may not always occur incidentally; it needs to be explicitly forged. It is important to develop strategies that we can use to examine our curricula and courses and strengthen teaching/research connections for the benefit of student learning. The process can begin by developing a set of principles that will guide us in designing curricula that seek alignment between the cultures and practices of the teacher-researcher and the learning experiences and processes of students. Ideally, we should be able to develop students'

understanding of the role of research in their discipline by bringing out current and prior research developments in the field, involving students in research experiences as part of their course work, and providing them with opportunities to understand how research is organized and carried out in the discipline/university.

Blended learning

NJIT is currently effecting strategies that will reverse recent enrollment declines and could, in fact, increase the enrollment beyond the high marks of recent years, as desired by the university administration. It is obvious that there will not be many more opportunities to expand the physical campus (with the addition of Central High School being a possible significant exception) and thus some thought should be given to the identification of creative ways to maximize the use of existing infrastructure. One possible approach is the combination of multiple strategies to teaching and learning that can be facilitated through the use of 'blended' virtual and physical resources. This should be pursued with an open mind but also with some degree of caution. It is also important to recognize that such an approach lends itself to some disciplines more than others.

As we continue to integrate technology into the face-to-face teaching milieu, the best of both modes of instruction can be combined to enhance the learning experience of students and stretch the use of NJIT's physical infrastructure. For example, combining technology-based content with traditional print materials is ideal for self-paced and collaborative learning. Unlike with traditional distance learning, blended courses in which some defined portion of the learning activities takes place online, without replacing the time spent in the classroom (although it can reduce it), lessens the reliance on physical resources by combining face-to-face instruction and technology-based learning. Blended instruction offers more flexibility and maximizes classroom efficiency by providing students with access to web-based resources and online learning activities. This could also accommodate various student learning styles, personalize the student learning experience, and facilitate communication with the instructor and peers.

It is extremely important to realize that incorporating such a major revision in pedagogy requires that a substantial number of faculty members have a significant understanding of the issues. Thus the experiences and skills, as well as the resources needed for successful implementation are just as important issues to consider as the specific changes themselves. Because developing a blended course requires much more than simply translating a traditional course, the institution of a faculty development program that goes beyond the traditional technology training workshops that are typically offered would be needed. Two important areas should be included: curriculum development and assessment.

NJIT Teaching and Learning Day

This concept involves having a day, somewhat parallel to the NJIT Research Day, in which there would be a focus on teaching and disseminating best practices around the campus, and possibly, around the country. In this way, faculty can

learn what works well and what doesn't work. We will work with the Provost's office to develop specific plans here but the program might work something like this: After final exams but before graduation, graduating students would be encouraged to meet with their departments to deliver feedback concerning the programs in which they are enrolled. Faculty also would share their experiences with colleagues in their departments. This would occur in the morning of Teaching and Learning Day. The chairs of departments in each college would meet with the Dean over lunch, and after lunch, the faculty would meet and receive the combined summarized feedback of all departments via presentations by the Deans. Incentives would need to be devised to encourage widespread faculty participation in this event.

2.9.4 Policy changes

Blended learning (and even on-line learning) can provide an environment with great potential for enriching the education of our students. Currently, the vast majority of NJIT students taking such courses are on-campus students. In general, we view this as a technology-enabled enrichment of the traditional curriculum, since many CSLA faculty and lecturers use some form of web technology in their courses, at the minimum having the syllabus and important documents online, while most use e-mail and some use web tools (WebCT or WebBoard) to teach and communicate with their students.

It is important to monitor the quality of education received by all students (DL or face-to-face) and assess student performance and progress toward earning their degrees. NJIT instructors of undergraduate courses report higher drop out and no-show rates in DL courses compared to traditional courses (as indicated by a CCS-IR study in 2002). In some cases, failures and 'D' grades are more prevalent in DL courses. Faculty from CSLA are currently working with IR to conduct an exhaustive study with the aim to develop an informed profile of students that will benefit and succeed in this type of learning. We hope the results of this study will enable us consider strategies (and possibly improve upon the policy implemented in CCS) to help us identify students who are likely to succeed in this type of learning environment. As we currently run DL courses only in Humanities and Mathematical Sciences, these guidelines will affect only those departments. It is conceivable that other departments will opt for introducing such courses in the future. The following policy is currently in place in CCS included here for the purpose of discussions:

1. Students taking DL courses must have completed more than 28 credit hours, including transfer credits.
2. Students taking DL courses must have a cumulative GPA of at least 3.0.
3. Students who have received a grade of W, D, or F in a face-to-face class will not be eligible to register for the same class in DL mode.
4. Seniors planning to graduate at the end of a semester and who have no other options for degree completion are exempt from the GPA criterion but not from the prior failure criterion.

2.9.5 Campus-focus [e.g., teaching excellence, research leadership]

CSLA is leading the way at NJIT in terms of enriching the teaching environment on campus and increasing funding for such education and research initiatives. Examples are listed in Table 2.9.5.1.

Table 2.9.5.1 Examples of teaching and research leadership by CSLA at NJIT

Teaching and Campus Environment	Research
CSLA, through the Dean's office, has organized a number of faculty groups from various departments to pursue education related funding.	CSLA grant funded research has grown from 7.2 to 7.7 to over 8 million dollars over the past 3 years; now a close second to NCE in grant funding among NJIT colleges.
CSLA faculty members are prominent in the Master Teacher group and in the Teaching Excellence committee. They have earned numerous internal and external teaching awards (both on the sciences and the humanities side)	CSLA encourages interdisciplinary grants bringing together groups from the College and university to participate in such through efforts in the Dean's office.

Other activities we hope to pursue to benefit the campus teaching and research environment include:

- Sending faculty to teaching workshops/conferences to bring the best and newest practices to NJIT quickly.
- Have faculty sit in on one another's classes and recommend improvements.
- Have researchers who have been successful at getting grants educate others who have been less successful to propagate knowledge about what works and how to present one's ideas

2.9.6 External communities [e.g., workshops US and abroad]

CSLA faculty success and recognition extend beyond the university environment. Our faculty and students from the sciences and the liberal arts side are being increasingly acknowledged for their contributions. Participating in conferences in leadership roles such as session/workshop chairs and even as conference chairs is now a routine matter. In addition, a number of our faculty members serve on editorial boards of prestigious journals. But we are extremely proud of the prestigious external awards that have been earned by CSLA faculty and students. Recent awards include:

Dr. Robert Miura (Mathematical Sciences) was elected as a member in the Section on Mathematics (A) of the American Association for the Advancement of Science (AAAS).

Dr. John Federici (Physics) won the R&D Council of New Jersey Thomas Alva Edison Patent Award.

Ms. Deepangi Pandit (PhD student in the Department of Chemistry and Environmental Science was one of 20 students selected from hundreds of applicants to attend the Computational Biophysics Workshop

Dr. Demetrius Papageorgiou (Math) was elected Fellow of the Institute for Mathematics and its Applications and awarded the Chartered Mathematician designation by the IMA.

Dr. Demetrius Papageorgiou (Math) is co-editor of the IMA Journal of Applied Mathematics.

Dr. Demetrius Papageorgiou (Math) is on the editorial board of the SIAM Journal on Applied Mathematics.

Mahesh Karwa (Chemistry: Advisor, Prof. Mitra) was one of the 2 NJIT winners of the NJ Chapter of the International Society for Pharmaceutical Engineering (ISPE) student poster competition with the poster titled, "Sol-gel Immobilization of Nano/Micro Particles for Microfluidics". Two winners from each participating university were selected. The top winners of the student poster competition will be eligible to compete in the ISPE Annual Meeting poster contest next November in Scottsdale, AZ.

The New York Institute of the Humanities and New York City Audubon presented, “What’s Up When Birds Sing?” David Rothenberg hosted the event.

Nancy Coppola (Humanities) won the Rudolph J. Joenk Jr. Award for best article published in IEEE Transactions on Professional Communication for 2004. The article, "Swift Trust in Virtual Teams," was written with Roxanne Hiltz (CCS) and Naomi Rotter (SoM). The Joenk Award winner is invited (expenses paid) to present a paper at the IEEE International Professional Communication Conference in Limerick, Ireland, July 2005.

Michelle Rittenhouse (Theatre) has won the Witter Bynner Fellowship, which carries the designation Playwright in Residence at the Abingdon Theatre Company in New York City.

Dr. Maurie Cohen was elected Chair of the Policy and Research Committee of the Environment and Technology Section of the American Sociological Association. The Chair serves a term of three years.

Prof. Carol Siri Johnson (Humanities) led an assessment workshop, “Cycles of Improvement: Assessing Validity in Technical Writing Programs Using Online Portfolios," at the 2005 Best Assessment Processes VII Symposium, sponsored by Rose-Hulman Institute and ABET, in Terra Haute, Indiana.

Nancy Coppola (Humanities) will be guest-editing a special issue of the journal Technical Communication devoted to technology transfer.

Drs. Anthony Fiory and Roumiana Petrova (Physics) served as session chairs in the symposium – “Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan”, as part of the 134th TMS (The Minerals Metals Materials Society) annual meeting and Exhibition.

Markus Rabus, is a graduate student in Physics at NJIT from Germany on a Rhodes Scholarship.

Dr. N.M. Ravindra (Physics) co-organized the symposium - “Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan". The proceedings of the symposium will be published in January 2006.

Sanjay Malhotra (Chemistry and Environmental Science) was chair of the International Conference on Green Chemistry & Sustainability in India in January 2006.

Dr. Maurie Cohen (Chemistry and Environmental Science) is a co-author and sponsoring signatory on the recently released Oslo Declaration on Sustainable Consumption.

Dr. Maurie Cohen (Chemistry and Environmental Science) has edited and contributed to the inaugural issue of the new journal Sustainability: Science, Practice, and Policy published by Cambridge Biological Abstracts.

Dr. Nancy Coppola (Humanities) has been invited to edit a special edition of *Technical Communications Quarterly*.

Dr. Nancy Coppola has been elected to serve on the Executive Committee of the Council of Programs in Technical and Scientific Communications.

Dr. Norman Tobias (Humanities) edited the 8th volume of the *The International Military Encyclopedia*.

Dr. Robert M. Miura (Mathematical Sciences) has been elected to the position of Vice Chair for the SIAM Activity Group on Life Sciences (SIAG/LS) for a two-year term running from January 1, 2005, through December 31, 2006.

Drs. Robert M. Miura, Demetrius Papageorgiou, and Michael Siegel are the organizers of a Focused Research Group on Analysis, Computations, and Experiments on Pinch-off in Liquid Jets held at the Banff International Research Station in Banff, Alberta, Canada on March 12-26, 2005 and funded by the Mathematical Sciences Research Institute, Berkeley, California and the Pacific Institute for the Mathematical Sciences, Vancouver, British Columbia, Canada.

Dr. Robert M. Miura (Mathematical Sciences) delivered a plenary lecture at the Conference on Nonlinear Integrable Systems and Their Real World Applications held at the Graduate School of Mathematical Sciences, The University of Tokyo, Tokyo, Japan on February 14-18, 2005.

Dr. Christopher Funkhouser won a Fulbright scholarship to spend a semester in Malaysia.

Dr. Eric Katz is book review editor of Environmental Ethics.

Dr. David Rothenberg was featured in an article in a major newspaper (*The New York Times*).

3. Academic Environment and Culture

An important element in CSLA’s quest for excellence is a supportive work environment and infrastructure for faculty and students. Although much has improved over the last decade, CSLA’s work environment is still far from where it needs to be in order to be comparable to that of the schools of arts and sciences at the leading universities.

3.1 Activities and assessment [What you do and how it works]

The academic environment of CSLA is the result of all related interactions within the college, university and outside community students, faculty, administrators and visitors. One can gauge the level of academic and scholarly engagement by observing the types and frequency of such activity on campus. Such activities also include the particular events organized by the academic clubs and organizations, seminars hosted by departments, programs of honor societies, and the forums for students to present and show case their education and research work. Some of the regularly scheduled activities of this nature organized through CSLA and its components are listed in Table 3.1.1. Other are presented below in sections 3.4 and 3.5.

Table 3.1.1 Examples of Activity the Promotes High Quality Academic Environment

Activity	Description
Seminars	Chemistry and Environmental Science • Weekly seminar series History • Annual Honors History Lecture NJIT every year, in association with the ADHC • Sponsor occasional events such as the Honors Colloquium on NJ's Environments to be held 4/26/06 Humanities • New Jersey Young Filmmakers Festival (annual competition) • NJIT-STC Technical Writing Awards (competition) Mathematical Sciences • Weekly Applied Mathematics Colloquium • Weekly seminars in Fluid Dynamics, Mathematical Biology, and Waves • Statistics Colloquium • Weekly Graduate Student Seminar Physics • Many-Body Down-folding Approach and its Application to Electron Gas
Honor Societies	Biology: Applying to Beta Beta Beta Mathematical Sciences: Pi Mu Epsilon
Undergraduate research programs	Biology: Biology students participate in both on and other off campus programs. Recently four biology majors have

	participated in major research symposia at Woods Hole, Moravian College, Montclair and Farleigh Dickenson. Mathematical Sciences: • Undergraduate Biology and Mathematics Research Program (funded by NSF) • Math students participate in off-campus research conferences (e.g., Moravian College)
Feedback sessions	Mathematical Sciences: Undergraduate and Graduate Feedback Sessions are held All CSLA departments
Conferences	Conference on Frontiers in Applied and Computational Mathematics (held annually)

Academic club listings are provided in sections 3.4 and 3.5.

3.2 Diversity [Diversity of culture]

By its nature, CSLA is a diverse college. It brings together a range of academic disciplines from sciences to the liberal arts. It also brings an equally diverse student cohort and faculty body. CSLA is a place where people of numerous ethnicities, backgrounds and cultures interact on a daily basis. CSLA does its part to enrich this atmosphere and educate students to an appreciation of cultures through our history and humanities offerings.

3.3 International [International environ. & culture]

A survey was performed by the Graduate Studies office concerning international connections at NJIT. Twenty five faculty members from NJIT responded to the survey, of whom 10 were from CSLA. Three were currently serving or willing to serve (doing what is not listed) and one was considering service.

Table 3.3.1. CSLA Respondents

DEPARTMENT OF RESPONDENTS	WILLING or CURRENTLY SERVING/ PARTICIPATING			
	YES	CONSIDERING	NO	NO RESPONSE
Math				✓
Chem				✓
Chem/EVSC	✓			
HSS			✓	
Phys			✓	
Chem				✓
Chem/EVSC	✓			
Phys	✓			
Phys		✓		
Che/EVCS			✓	

In the following table, we list the CSLA respondents' international and foundation connections. As we can note, CSLA faculty have some international contacts. We hope to grow our international relationships in the future by building on those relationships CSLA faculty currently have with colleagues overseas.

Table 3.3.2. Possible Contacts

DEPARTMENT OF RESPONDENT	FOUNDATION CONNECTIONS	UNIVERSITY CONNECTIONS	COUNTRIES
Chem	Marie Curie Senior Fellowship	University of Karlsruhe (Germany), National University of Ireland-Galway.	Germany, Ireland
Chem/EVSC	NSF,ESF	European Universities: KTH, Chalmers (Sweden), ETH, Delft (Netherlands).	Sweden, Netherlands
Phys	-	University of Leeds (England), University of Rome (Italy), Max Plank University (Germany)	England, Italy, Germany
Chem/EVSC	NIH, NSF	-	-
Phys	CNRS, ICTP, UNESCO, IMF, NATO	Indian Institute of Technology, Indian Institute of Science, CNR (Italy), CNRS (France).	India, France, Germany UK, Italy, Austria
Che/EVCS	NSF, NAS, NRC,	-	Netherlands, England

3.4 Quality of undergraduate life

Most of the CSLA programs are small in number, but they are growing. We list by department the clubs, facilities and other major activities in which NJIT undergraduate students take part and which add to the quality of undergraduate life at NJIT.

Table 3.4.1. Undergraduate Student Activity

Department or Division	Biology	Chemistry and Environmental Science	History	Humanities	Mathematical Sciences	Physics
Club, Facility or Activity	Society of Biology; Applying to Beta Beta Beta Honor Society	American Chemical Society student chapter; Chemistry Olympics for HS students.	History club (based at Rutgers/ Newark)	Student chapter: Society for Technical Communication web.njit.edu/ STC/ Oral presentations of PTC and STS senior projects	Math Club; Pi Mu Epsilon Honor Society; Capstone Lab; Putnam Exam; Math Contest in Modeling;	

As the number of CSLA majors grows, we expect to reach critical mass in all our disciplines so we can expand these activities and start new ones in the departments in which we do not yet have undergraduate student participation.

3.5 Quality of graduate life

Graduate programs are also small in number, but they are growing as well. We anticipate that efforts to strengthen relationships with New Jersey's four year universities will accelerate the growth of our graduate programs, especially if we succeed in concluding BS/MS arrangements with these institutions. We list by department the clubs, facilities and other major activities in which NJIT students take part and which add to the quality of undergraduate life at NJIT.

Table 3.5.1. Professional Clubs in CSLA

Department or Division	Chemistry and Env. Science	Humanities	Mathematical Sciences
Club, Facility or Activity	American Chemical Society, student chapter	Society for Technical Communication; MSPTC On-line Community; MSPTC Newsletter	GSA-Math Club; SIAM Student Chapter

4. Cooperation with NJ Institutions [Joint activities]

4.1 UMDNJ, Rutgers-Newark, State Colleges, County Colleges, and others

CSLA has a unique connection with Rutgers-Newark. Two of our departments (Biological Sciences and History) are federated. There are excellent relationships between our Chemistry and Environmental Science Department and its counterpart at Rutgers-Newark and, to a lesser extent, between the two physics departments. Our biology faculty are physically on the Rutgers campus with joint appointments in Rutgers' Biological Sciences Department. There are also three geology faculty members from Rutgers-Newark in our York Center. NJIT students take most of their biology courses at Rutgers and students augment NJIT's general education courses by selecting some from Rutgers. In addition, a host of academic programs from the undergraduate to the doctoral levels are joint between the two institutions. Most recently, the two institutions reached a collaborative agreement in the area of teacher certification. This relationship has proven mutually beneficial.

CSLA has also developed a strong relationship with UMDNJ. We share, with Rutgers-Newark and UMDNJ, a Masters in Public Health. All of CSLA's academic programs participate in the accelerated pre- medical/dental/optometry options with UMDNJ. Most recently, CSLA and UMDNJ reached an agreement to create the BS/DPT (Doctorate in Physical Therapy) and the BS/MS PA (Physician Assistant) degrees.

We have also developed strong relationships with the county/community colleges. We are finalizing joint admissions agreements and articulation agreements with all 19 of these schools. We are also developing BS/MS programs with four-year colleges in NJ. Most recently, we worked with Continuing Professional Education to develop one such agreement with William Paterson University. We will this agreement as a model to form additional relationships with other state colleges. Finally, CSLA majors can participate in the accelerated Law degree with Seton Hall Law school.

4.2 Articulation agreements

Increasing enrollment is a strategic priority for CSLA. We have already put in place strategies to effect this at the undergraduate level that will increase both the application pool for first-year applicants and the resulting entering class.

4.2.1 In state

NJIT has traditionally attracted a large number of students via transfer routes. Historically, these students enrolled in engineering and computing programs and to a lesser extent in architecture and management. All of these colleges/schools have articulation agreements with the county/community college in NJ. CSLA has now caught up with in this important task and we have put together drafts for such agreements with all county/community colleges in NJ. We are now in the process

of signing these agreements (Bergen Community College and Essex County College were the first to be concluded in February 2006).

4.2.2 Out of state

We have not yet engaged in any out of state recruitment activities. However, it is natural that we pursue this route once we have finalized our current local initiatives.

5. Enrollment – undergraduate and graduate [Provided by IRP]

Enrollment begins with the initial application for admission. It is important that we receive applications from many well-qualified students, those who have a reasonable probability of completing their degree within 6 years (or less) of matriculating at NJIT. Data for 2003-2005, for CSLA applications, acceptance and enrollment are provided in Table 5.1. We keep the grand total line for NJIT for comparison.

Table 5.1 shows undergraduate application, admission, and enrollment data

Table 5.1 F2003 - F2005 Freshmen Application, Admission and Enrollment Rate

Program	F2003					F2004					F2005				
	App.	Adm.	Adm. Rate	Enr.	Yield	App.	Adm.	Adm. Rate	Enr.	Yield	App.	Adm.	Adm. Rate	Enr.	Yield
APPH	18	13	72%	1	8%	18	11	61%	3	27%	18	13	72%	8	62%
BIOL	140	114	81%	21	18%	146	112	77%	25	22%	169	132	78%	23	17%
CHM	19	11	58%	4	36%	17	12	71%	6	50%	32	22	69%	7	32%
EVSC	6	3	50%	1	33%	3	2	67%	1	50%	8	5	63%	2	40%
HIST	3	2	67%	1	50%	4	2	50%	0	0%	13	10	77%	1	10%
MATH	24	15	63%	5	33%	29	20	69%	5	25%	36	30	83%	13	43%
PTC	10	4	40%	2	50%	15	9	60%	6	67%	9	5	56%	6	120%
STS	11	6	55%	2	33%	6	3	50%	1	33%	6	3	50%		0%
UND	81	51	63%	17	33%	52	31	60%	13	42%	76	59	78%	29	49%
CSLA Total	**312**	**219**	**70%**	**54**	**33%**	**290**	**202**	**70%**	**60**	**30%**	**367**	**279**	**76%**	**89**	**32%**
NJIT Total	**2,566**	**1,741**	**68%**	**738**	**48%**	**2,538**	**1,685**	**66%**	**690**	**41%**	**2,562**	**1,831**	**71%**	**783**	**43%**

From Table 5.1, we note that the percentage accepted into CSLA has been greater than for NJIT (72% vs. 68% on average for the years shown) on the whole, while our yield is well below that of all of NJIT (32% vs 44% on average for the years shown). This highlights an area where we might be able to improve our results. We need to make a greater effort to *seal the deal* for students accepted to CSLA. Despite the low yield, the CSLA fraction for First-Time-Full-Time-Freshmen has increased from 7.3% to 11.3% from Fall 2003 to Fall 2005.

5.1 Trends to date

We are proud that the focused recruiting efforts, teaching and curriculum development work of recent years have led to an increase in undergraduate enrollment in CSLA majors over the past 3 years of 32% (from 252 to 332). See Table 5.1.1. The Actuarial Science and Applied Math programs are now options in the Mathematical Sciences program. Nursing has been discontinued and Professional Technical Communication has migrated to Communication. The number of undecided students in CSLA majors is the only area in which enrollment has dropped by more than 1 student over the past 3 years, while

several programs have grown quickly, by over 50% in that time (Applied Physics, Biology, Chemistry, History and Mathematical Sciences). However, this does not appear to be a trend since the number of applications and acceptances in the undecided category for next academic year is showing a sharp increase.

Table 5.1.1 Undergraduate Enrollment trends in CSLA majors

Table 5.1.1 Undergraduate Enrollment in CSLA disciplines from 2002-2005				
CSLA	F2002	F2003	F2004	F2005
ACTS*	**16**	**1**	**1**	**1**
APMT*	**37**	**1**	**0**	**0**
APPH	**16**	**17**	**22**	**25**
BIOL	**37**	**47**	**65**	**79**
CHM	**15**	**15**	**24**	**24**
COMM	**0**	**0**	**0**	**7**
EVSC	**10**	**8**	**8**	**11**
HIST	**14**	**13**	**17**	**24**
MATH	**0**	**76**	**87**	**90**
NURS*	**24**	**15**	**4**	**0**
PTC	**26**	**30**	**25**	**18**
STS	**12**	**17**	**18**	**16**
UND	**45**	**31**	**20**	**37**
Total	**252**	**271**	**291**	**332**
* program has been discontinued				

Notice that this increase was attained despite the elimination of the Nursing majors. If we were to take the Nursing majors out of Table 5.1.1, the increase would be 45%. This gives us confidence that our strategies are yielding results and that the increased efforts planned (see Recruiting, section 5.4. below) will lead us to even more enrollment successes. From 2002-2005, the fraction of women in CSLA programs (excluding the discontinued Nursing program) has been steady, going from 35% to 36%.

Table 5.1.2 Undergraduate enrollment trends in CSLA majors by gender

Table 5.1.2 Undergraduate Enrollment in CSLA disciplines from 2002-2005 by Gender

	F2002			**F2003**			**F2004**			**F2005**		
CSLA	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
ACTS*	**6**	**10**	**16**	**1**	**0**	**1**	**1**	**0**	**1**	**1**	**0**	**1**
APMT*	**15**	**22**	**37**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
APPH	**2**	**14**	**16**	**2**	**15**	**17**	**3**	**19**	**22**	**3**	**22**	**25**
BIOL	**20**	**17**	**37**	**26**	**21**	**47**	**37**	**28**	**65**	**47**	**32**	**79**
CHM	**7**	**8**	**15**	**7**	**8**	**15**	**10**	**14**	**24**	**10**	**14**	**24**
COMM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**5**	**7**
EVSC	**5**	**5**	**10**	**5**	**3**	**8**	**4**	**4**	**8**	**6**	**5**	**11**
HIST	**6**	**8**	**14**	**7**	**6**	**13**	**7**	**10**	**17**	**4**	**20**	**24**
MATH	**0**	**0**	**0**	**25**	**51**	**76**	**26**	**61**	**87**	**33**	**57**	**90**
NURS*	**22**	**2**	**24**	**13**	**2**	**15**	**4**	**0**	**4**	**0**	**0**	**0**
PTC	**7**	**19**	**26**	**8**	**22**	**30**	**5**	**20**	**25**	**5**	**13**	**18**

STS	**4**	**8**	**12**	**7**	**10**	**17**	**7**	**11**	**18**	**7**	**9**	**16**
UND	**8**	**37**	**45**	**6**	**25**	**31**	**1**	**19**	**20**	**3**	**34**	**37**
Total	**102**	**150**	**254**	**108**	**163**	**271**	**105**	**186**	**291**	**121**	**211**	**332**

*** program has been discontinued**

With respect to our graduate enrollment, the numbers have risen almost 20% from 2002-2005 (taking out the discontinued Computational Biology Program). We have created a graduate recruitment committee that will develop initiatives to help us continue and increase the growth of the enrollment in CSLA graduate programs (see Recruiting, section 5.4 below). The fraction of CSLA graduate enrollment that is female has grown from 41% to 48% in this time period.

Table 5.1.3 shows Graduate enrollment data for CSLA by gender

Table 5.1.3 Graduate Enrollment in CSLA disciplines from 2002-2005

	F2002			**F2003**			**F2004**			**F2005**		
CSLA	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
APMT	**3**	**5**	**8**	**4**	**7**	**11**	**2**	**7**	**9**	**2**	**7**	**9**
APPH	**4**	**32**	**36**	**7**	**30**	**37**	**11**	**34**	**45**	**8**	**25**	**33**
APST	**12**	**4**	**16**	**12**	**9**	**21**	**18**	**8**	**26**	**18**	**15**	**33**
BIOL	**2**	**2**	**4**	**2**	**2**	**4**	**1**	**2**	**3**	**3**	**2**	**5**
CHEM*	**8**	**7**	**15**	**5**	**9**	**14**	**6**	**4**	**10**	**0**	**0**	**0**
CHM	**0**	**0**	**0**	**2**	**0**	**2**	**5**	**3**	**8**	**12**	**5**	**17**
EPS	**8**	**11**	**19**	**15**	**11**	**26**	**15**	**10**	**25**	**9**	**11**	**20**
EVSC	**22**	**29**	**51**	**25**	**28**	**53**	**20**	**20**	**40**	**26**	**25**	**51**
HIST	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
MATH	**9**	**18**	**27**	**10**	**25**	**35**	**8**	**23**	**31**	**10**	**22**	**32**
OSIH	**0**	**5**	**5**	**0**	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**0**
PTC	**16**	**7**	**23**	**26**	**9**	**35**	**18**	**16**	**34**	**28**	**16**	**44**
Total	**84**	**120**	**204**	**108**	**132**	**240**	**104**	**128**	**232**	**116**	**128**	**244**

*** program has been discontinued and incorporated into other program (CHEM to CHM)**

The total enrollment in CSLA was 563 at the start of the Spring 2006 semester. This is up from 526 at the start of the Spring 2005 semester.

5.2 Projections [Your projections based on trends, include explanations]

From 2002 to 2005, CSLA undergraduate enrollment grew steadily, totaling a 45% increase (disregarding the discontinued Nursing program). With the addition of new programs and the refocusing of current programs to highlight our strengths and the aspects of our programs that make NJIT special, especially with regard to career opportunities for those who major in our disciplines (for example the change of our program in Professional and Technical Communication to Communication), we expect to grow CSLA enrollment to double the current enrollment over the next five years. If successful, these efforts will lead to CSLA majors constituting about 12% of total NJIT undergraduate enrollment (if NJIT undergraduate enrollment remains at Fall 2005 levels). While this is quite an ambitious goal, we feel that our planned strategies combined, with dedicated efforts and strong leadership can enable us to succeed in this aspect of our

mission. It is important to note that given the application trends at the undergraduate level, this enrollment goal may be attained sooner than planned.

CSLA graduate enrollment grew nearly 20% (from 204 to 244) over the 2002-2005 period. CSLA is committed to further increasing graduate enrollment and increasing the diversity of the graduate student population. CSLA has approximately 140 MS students and 110 PhD students. With a revitalized graduate recruiting plan, we expect to grow the enrollment in these programs 35% over the next 5 years (190 in our Masters programs and 150 in our PhD programs), thus constituting 12% of total NJIT graduate enrollment (if NJIT undergraduate enrollment remains at Fall 2005 levels). We also hope to increase the percentage of graduate students who are US citizens and the percentage coming from minority groups, as well as improve the quality of our graduate students.

The following enrollment projections for the College of Science and Liberal arts exclude the numbers from both the undergraduate Nursing and the graduate Materials Science programs.

Table 5.2.1 CSLA Enrollment Projections (compare to earlier table such as honors). We have increased CSLA undergraduate enrollment by 45% over the past 3 years and expect to double CSLA enrollment over the next 5 years. While CSLA Graduate enrollment has decreased by 4% over the past 3 years, we expect to increase graduate enrollment by over 35% over the next 5 years. These increases would boost CSLA enrollment from 7% of NJIT's total in 2005 to 12% in 2010.

Year	CSLA Undergraduate Enrollment and Projections	CSLA Graduate Enrollment and Projections	CSLA Total Enrollment and Projections	CSLA Percentage of Total NJIT Enrollment
Fall 2002	**228**	**255**	**483**	**5%**
Fall 2003	**256**	**241**	**497**	**5%**
Fall 2004	**287**	**232**	**519**	**6%**
Fall 2005	**332**	**244**	**576**	**7%**
Fall 2006*	**346**	**268**	**614**	**8%**
Fall 2007*	**442**	**280**	**722**	**9%**
Fall 2008*	**503**	**299**	**802**	**10%**
Fall 2009*	**584**	**320**	**904**	**11%**
Fall 2010*	**664**	**340**	**1004**	**12%**

*** Projected Enrollment**

Table 5.2.2 CSLA FTFTF (from SAT file) projections. CSLA has seen an increase of over 70% in the number of first time full time freshmen over the past 3 years and we intend to double this number over the next 5 years.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
CSLA FTFTF Enrollment	**47**	**46**	**55**	**81**	**93**	**107**	**124**	**142**	**162**

5.3 Retention

Retention is an area of great interest to NJIT and to universities in general. We note, however, that in the past the number of first time full time students who were CSLA majors was relatively small and thus subject to relatively wide swings that should not be taken too seriously. All in all, our numbers are not much different from the university as a whole. For the past three years, the CSLA retention rate was 82%, the same as for the university as a whole.

Table 5.3.1 provides data on retention of first time full time freshmen in each of CSLA's majors over the past few years

Table 5.3.1 F2002 - F2005 Retention Rate by School and Program*

School	Program	F02 - F03			F03 - F04			F04 - F05		
		F02 FTFTF	F03 Ret	Ret Rate	F03 FTFTF	F04 Ret	Ret Rate	F04 FTFTF	F05 Ret	Ret Rate
CSLA	ACTS	1	1	100%						
	APMT	4	3	75%	3	3	100%	7	3	43%
	APPH	2	2	100%	1	1	100%	3	3	100%
	BIOL	8	7	88%	18	16	89%	23	21	91%
	CHM	5	5	100%	3	2	67%	6	6	100%
	EVSC				1	1	100%			
	HIST	1	1	100%	1	0	0%			
	PTC	3	3	100%	2	1	50%	3	3	100%
	STS	1	1	100%	2	2	100%	1	1	100%
	UND	22	18	82%	15	8	53%	12	10	83%
	Total	**47**	**41**	**87%**	**46**	**34**	**74%**	**55**	**47**	**85%**

***Note: For student who retained in any program at NJIT**

While more data is needed to really understand why students leave NJIT in general and CSLA in particular, whether it is financial, environmental, academic, etc. we are taking action to increase the retention rate. As detailed below, we will promote excellence in teaching, improve advisement and mentoring, work with our advisory board to increase scholarship funds, improve the academic quality of student life, and form stronger learning communities.

The CSLA plan to improve retention follows:

1. Improve retention of undergraduate students

   Retention is an important concern for the College. It involves complex issues of program rigor and delivery and academic advising, as well as a wide range of student attributes (preparedness, study habits, employment, financial resources, commitment, motivation, and determination).

The CSLA numbers for retention from Table 5.3.1 above should be further improved, and we are proposing the following retention targets for the next five years.

Our retention plans are built around improving the quality of CSLA academic programs and instruction, monitoring students' progress, and providing efficient and competent academic advising. Excellence in teaching by the faculty, special lecturers, adjuncts, and teaching assistants will be rewarded, technology- and pedagogy-enriched instruction will be promoted, superior performance by the students will be expected and developmental advising to help students establish immediate as well as long-term academic and professional goals will be instituted. Another important retention-related function will be to foster a College-wide environment where the students interact with administrators, faculty, and staff outside the classroom.

As with student recruiting, successful retention planning and implementation requires involvement of the College administration, chairs, faculty and staff. Our retention activities for the coming year are enumerated below.

(a) Student-related activities:

i. Promote high quality teaching.

ii. Publish notes and syllabi for all CSLA courses on the College web site. The syllabi should contain clear course objectives and expectations.

iii. Promote quality academic advising.

iv. Meet with all incoming CSLA students at the beginning of their first term.

v. Provide opportunities to CSLA students for involvement in departmental clubs and honor societies; assign space for a club office in each department.

vi. Using focus groups and student satisfaction surveys, seek input from students on academic and social aspects of our programs.

vii. Interview students who drop out of CSLA programs and determine their reasons for leaving.

(b) Faculty-related activities:

i. Hold orientation for new faculty which addresses retention as one of its components.

ii. Establish and disseminate College and departmental procedures and policies.

iii. Promote the importance of quality teaching by emphasizing it in faculty retention, tenure and promotion cases.

iv. Promote the CSLA excellence in teaching initiative and create a fund to support the improvement of teaching.

v. Establish senior-junior faculty mentoring program.

vi. Enhance the quality of adjuncts and teaching assistants by improving the compensation scale.

(c) Advisory board role:

i. Work to increase scholarship funds

ii. Work to increase coop and internship opportunities

The initiatives outlined above should also have a direct impact on the CSLA graduation rate. Our current six-year graduation rates were 62%, 54% and 46% in 2003, 2004 and 2005, respectively. While it appears that the trend is poor, especially in relation to the growing NJIT percentages of 49%, 53% and 54%, we note that there were a small number of FTFTF in Fall 1997, 1998 and 1999, with a large fraction in the low graduation rate undecided category. Without the undecided category, the CSLA 6 year graduation rates were 62%, 58% and 52%. They do not indicate a positive trend, but with such small numbers (13 to 24 incoming FTFTFs in those years) one cannot make generalizations with great confidence. Despite this, we intend to increase the graduation rate to the NJIT average of 60% by 2010.

Table 5.3.2 shows the 6-Year graduation rate in CSLA

Table 5.3.2 F1997 - F1999 6-Year Graduation Rate by School and Program

Program	F97 - F03			F98 - F04			F99 - F05		
	F97 FTFTF	Grad in 6-Year	Grad Rate	F98 FTFTF	Grad in 6-Year	Grad Rate	F99 FTFTF	Grad in 6-Year	Grad Rate
ACTS	2	1	50%	2	1	50%			
APMT	2	2	100%	5	2	40%	4	3	75%
APPH	3	2	67%	6	4	67%	1		0%
BIOL							9	6	67%
CHEM	2		0%	4	4	100%			
HIST	1		0%	1		0%	3		0%
PTC	1	1	100%	4	3	75%	4	2	50%
STS	2	2	100%	2		0%			
UND				13	6	46%	20	8	40%
Total	**13**	**8**	**62%**	**37**	**20**	**54%**	**41**	**19**	**46%**
Grand Total	**568**	**277**	**49%**	**565**	**299**	**53%**	**658**	**353**	**54%**

2. Improve retention of graduate students

The retention rate of CSLA graduate students has been approximately 76% over the past few years, about 7 points higher than the NJIT average of 69% (for Fall 2002-Fall 2005). While our retention rate appears to be very good in relation to NJIT as a whole, we note that it is almost entirely due to the facts that 1) PhD students are retained at much higher levels than Masters students (by about 10 percentage points) and 2) that CSLA has about equal numbers of Masters and PhD students, while for NJIT as a whole, there are three times as many Masters degree students as PhD students.

Graduate retention is as important as recruiting to maintaining a critical mass of students. It involves most of the same complex issues as with undergraduate retention, particularly with respect to maintaining the rigor and quality of the programs. Student advisement and commitment of the faculty for student mentoring are essential to ensuring students' successful completion of these programs. Specific immediate activities to facilitate students' graduate degree completion are enumerated below:

i. Develop and improve handbooks and orientation sessions to help students understand the critical steps leading to a graduate degree and the faculty, staff, campus facilities and services available to meet their needs.

ii. Encourage students to meet regularly with program advisors.

iii. Work closely with GSA to develop a formalized plan to enrich the academic and social experience of all graduate students. Specific activities include: increasing opportunities for new graduate students to meet the faculty and other fellow graduate students, encouraging graduate student participation in department academic and social events, enhancing exhibitions of graduate students' work, i.e. research days.

iv. Improve facilities for students: Construct a CSLA graduate student lounge to increase the sense of community and interactions among graduate students in the various CSLA disciplines.

5.4 Recruitment

5.4.1 Undergraduate

Recruiting an outstanding, diverse undergraduate student body is a high priority for CSLA. Program offerings in all departments are of high quality and the undergraduate cohort is reasonably diverse (36% female, and at least 22% underrepresented groups in Fall 2005).

The following items comprise the CSLA undergraduate recruiting immediate and long-term goals:

CSLA is investing efforts to increase the quality and quantity of its freshman and transfer cohorts. Carefully planned enrollment increases can result in a strong and diverse student body that will help us to provide an enhanced academic environment for our students and a more challenging learning experience. Improving the academic quality of students in our programs will also allow us to raise academic standards, since the quality of the College is in large part determined by the quality of its students.

The pool of eligible incoming students must be expanded to attract more high achieving students from out-of-state. We believe we can compete with other nationally recognized universities on a program-to-program basis to attract in-state and out-of-state students. To do this, we must publicize our program offerings and also actively pursue the development of a CSLA scholarship program that makes NJIT competitive and appealing to this student population.

We also intend to work aggressively to recruit more women and minority students to our programs. Women and minorities comprise 36% and over 22% respectively. While the percentage of women is nearly twice the NJIT value and the minority value is about the same as the NJIT value, we still feel that they can, and should, be increased. In addition to our recruitment strategies that target students without regard to ethnicity or gender, we will work closely with the Constance Murray Women's Center, the Educational Opportunity Program and Admissions to increase representation of women and minorities among the CSLA

student body. We will also target specific high schools and expand cooperation with the Newark Public Schools for this purpose.

It is our goal to increase the overall undergraduate enrollment from 332 to 664 students by Fall 2010. Successful recruitment of students requires active involvement of the College administration, chairs, faculty and staff. We have begun a series of recruitment activities that we intend to sustain for the long term and until our goals are met. These activities are given below, organized into three categories and prioritized within the categories.

a. Outreach to students:

   i. Devise effective operating procedures for the departments and College staff to respond to mail, telephone calls, and Internet inquiries from students, parents and guidance counselors.

   ii. Communicate directly (e.g. letters, phone calls) with prospective applicants and accepted students as identified by the admissions office.

   iii. Participate in events on-campus sponsored by NJIT (E.g. Fall Open House) CSLA (Career Day) or Departments (e.g. Chemistry Olympics) and off-campus recruiting events sponsored

   iv. Develop materials for admissions, open houses and faculty visits to high schools and recruitment events that make it possible for any faculty from CSLA, admissions person or student recruiter to be helpful to students interested in any CSLA program.

   v. Establish summer exploration programs in the sciences and the liberal arts for high-ability high school students.

   vi. Organize student campus visits by math/science/liberal arts groups, both during the academic year and during the summer.

   vii. Establish a CSLA scholarship program.

   viii. Visit New Jersey high schools and key high schools in surrounding states to publicize undergraduate programs. Visits will be made by undergraduate program directors, undergraduate advisors, volunteer faculty, Associate Dean, and students (when possible).

   ix. Get the message out that we are willing to provide speakers for high school student organizations.

   x. Encourage faculty to include funds for undergraduate research opportunities in grant proposals.

b. Outreach to teachers and guidance counselors:

i. Establish a yearly professional development conference for high school teachers. (Already started)

ii. Hold information sessions and work with admissions to educate guidance counselors, foster better relations with them and provide a forum for feedback.

iii. Link high school teachers with our first-year course instructors and have them act as resources to teachers. This will include sharing of instructional material and projects, evaluation of textbooks, etc. This will not take much extra effort as we can combine it with the professional development conference (item i.).

c. Outreach to NJIT Admissions Office:

i. Work with the Admissions Office to provide recruiting staff with a clear understanding of all CSLA programs and have admissions personnel better able to help us recruit.

ii. Develop a system of communications between CSLA and the Admissions Office to facilitate a coordinated recruiting effort.

iii. Participate in all admissions open houses and recruiting events.

We will also enlist CSLA alumni to help us recruit by making calls to students who have expressed an interest in our programs. Training for these alumni will be provided by Admissions and CSLA. We need to identify alumni recruiters from all parts of New Jersey and surrounding states.

Several publications which should be provided by other units at NJIT will be needed to support recruiting efforts. These should address potential applicants' most commonly asked questions (e.g., campus resources, activities, and athletics), as well highlighting faculty credentials, research initiatives, and achievements.

5.4.2 Graduate

CSLA is committed to strengthening and increasing graduate enrollment, while increasing the number and diversifying the graduate student population. One must, however, keep in mind that graduate enrollment is heavily dependent on student support through the use of teaching and research assistantships. This support comes from NJIT and from external grants. The number of MS students and PhD students in CSLA is roughly equal to that of the undergraduates (approximately 140 MS and 110 PhD. The PhD student enrollment in CSLA constitutes about 25% of NJIT's total PhD enrollment and CSLA students earn

about 30% of NJIT's total number of PhDs. Females constituted 48% of CSLA's graduate students in Fall 2005 (up from 41% in 2002) while minorities consistently constituted a little over 10% of the CSLA graduate student cohort over these years. We need to increase the percentage of students who are US citizens and those who come from minority groups, improve the quality of our graduate students, and increase the number MS and PhD students (by 35% over the next five years).

The enrollment at the graduate level can be increased in a number of ways including better student recruitment activities and external outreach. In particular, we plan to strengthen our relationship with NJ state colleges by formulating BS/MS articulation agreements in areas that do not compete with the state colleges. Also, new program options that will create a more attractive and timely variety of graduate specializations in the CSLA will be added. Departmental plans include developing specialties in biophysics, biochemistry and pharmaceutical chemistry, expanding and strengthening the Professional and Technical Communication program to cover design and usability, expanding offerings in biostatistics as well as expanding our efforts in computational biology by returning the Masters program to CSLA once the College of Computing Sciences creates its new program in Bioinformatics.

The following items comprise the CSLA graduate recruiting plan. CSLA has numerous graduate programs, and several of them are very successful. Many of our graduates have gone on to positions in academia, business and industry. This has been a very important component of our mission and has enabled us to establish good relationships with local industries and to respond to their demands for high-quality students with practical knowledge.

However, for many years, a large percentage of students in graduate programs in Mathematics and the Sciences in the United States have been international students. CSLA intends to increase enrollments of domestic students by strengthening domestic in-state and out-of-state enrollments, and intends to diversify the countries of origin of international students. The first issue will be addressed by targeting a specific set of potential applicants: domestic students at other NJ undergraduate institutions, in particular, schools without graduate programs in the CSLA disciplines. The second issue will be addressed by targeting applicants from parts of the world currently underrepresented at CSLA, such as Eastern Europe, the Near East, the Caribbean, and Latin America, as well as taking advantage of opportunities to attract students who will pay for their NJIT education in full from regions where we get a significant cohort of graduate students.

Implementation of our graduate program recruitment efforts will be shared by all College faculty and staff, with the primary faculty responsibility falling on the chairs, associate chairs, and directors of graduate programs. The recruitment activities listed below are both extensive and intensive.

Our planned activities can be characterized as follows:
(a) Outreach to domestic, off-campus undergraduate students

i. Make visits to local colleges to publicize CSLA graduate program opportunities. Visits should be conducted by faculty, and students. Such visits will strengthen our relationships with NJ state colleges and during these visits, we can promote BS/MS articulation agreements (that we are now implementing by working with CPE) in areas that do not compete with the state colleges.

ii. Have CSLA faculty volunteer to give seminars at local colleges and universities (with travel expenses provided by NJIT) and use these opportunities to set up discussions with undergraduate students about our graduate programs

iii. Have research active faculty recruit at technical meetings and during seminar invitations to other universities.

iv. Communicate directly (e.g., letters, phone calls) with selected groups of prospective applicants. Potential applicants can be identified through the admissions office.

v. Communicate (letters, phone calls, brochures, posters) with deans and department chairs at local colleges and universities.

vi. Provide summer courses and/or Research Experiences for Undergraduates programs in specially focused areas that are highlights of our graduate programs. This can be used to increase interest in our graduate programs by undergraduate students at NJ's undergraduate institutions, as well as undergraduate students from New Jersey who are enrolled at out-of-state institutions but who come home for the summer.

vii. Establish and expand current collaborations between CSLA faculty and faculty in related disciplines at local colleges and universities. Play a larger and more coordinated role in undergraduate oriented discipline-specific organizations (e.g., Math Assoc of Amer, Amer Chem Soc) at the state and regional level.

viii. Select key undergraduate schools for partnerships and develop contacts at these schools for coordination.

ix. Bring in selected faculty or department chairs from local colleges and universities from which we endeavor to attract graduate students so that these individuals can return to their campuses with the requisite knowledge to encourage students to pursue graduate degrees at NJIT.

(b) Outreach to internal students

i. Create College-wide undergraduate research experiences. One example for achieving this is to organize a one-day research workshop at which faculty and graduate students make presentations to CSLA undergraduates about their work and at which undergraduate students who have participated in research at NJIT present the results of their work. Undergraduate students could be paired with graduate student presenters and aid in preparation of the presentations.

ii. Invite undergraduate students to departmental seminars and lectures, in particular, honors students.

iii. Actively pursue strong students in undergraduate classes and encourage them to consider graduate school. The same strategy can be applied to strong students in the M.S. programs, who can be encouraged to consider the Ph.D. programs.

iv. Promote the five-year BS/MS program and encourage all eligible students to join.

(a) Media Outreach

The purpose of the media development and outreach activities are both to improve recruitment and increase applications in Fall 2006 and beyond as well as to increase visibility and raise awareness of NJIT's CSLA graduate program offerings. We expect increased visibility to have longer term positive influences on recruitment efforts.

We will develop new print, multimedia and web-based publications and spell out program offerings by department and clearly define the student qualities sought. The document should differentiate our programs by pointing out special or unique aspects, i.e., how NJIT programs differ from those at competing institutions.

We will develop department-specific advertising copy and provide funding for departments to advertise in the most effective publications for recruiting students to their disciplines. We have found a direct correlation between successful recruitment efforts vis-à-vis targeted advertising in specific publications.

We will review our graduate program websites to ascertain ways we might improve them to make them more effective recruiting tools.

(b) Other activities

Enable departments to quickly and efficiently take advantage of opportunities to attract full paying international students when they arise to fully fund well qualified graduate students in Physics at NJIT, a current project underway in graduate admissions).

Create more attractive and timely graduate specializations, including options which take advantage of cross-disciplinary expertise and collaborations at NJIT. Plans include developing specialties in biophysics, biochemistry and pharmaceutical chemistry, expanding and strengthening the Professional and Technical Communication program to cover design and usability, expanding offerings in biostatistics and expanding our efforts in computational biology by returning the MS program to CSLA once the College of Computing Sciences creates its new program in Bioinformatics.

Achieve national prominence and enhance NJIT's reputation for outstanding, cutting-edge research. This can play a significant role in attracting highly qualified graduate students. CSLA has already made major strides in research and scholarship over the last five years, including NSF Career Awardees. Both the quality and quantity of research publications has improved greatly, and annual research expenditures have now reached nearly nine million dollars. These achievements give testimony to CSLA's efforts to enhance and expand research/scholarship quality and productivity. Continuing on this path and increasing the visibility of our accomplishments among undergraduates throughout NJ and the USA will help our recruitment efforts. Specific activities to accomplish this goal include hosting scholarly events (such as the annual Frontiers in Applied and Computational Mathematics conference), creating new endowed chairs and student fellowships, and increasing funding to support graduate education.

5.5 Transfers

One way to increase enrollment is by expanding the number of transfer students coming into NJIT. CSLA currently attracts about as many transfer students each year as FTFTF in its disciplines. These numbers have been growing and we have been developing strategies to further increase the pipeline of students coming from community colleges to our programs. Much work has gone into developing articulation agreements and joint admissions agreements with community colleges. In addition, we hope to obtain federal funding to provide workshops for community college faculty to help them align their curricula more closely with that of CSLA disciplines and provide services for transfer students. Other initiatives to increase transfer enrollment include working with admissions to increase visits to community colleges, developing new promotional materials specifically for the community college audience, and inviting community college transfer advisors to workshops at NJIT to discuss articulation, joint admissions

and other topics of mutual interest. From Table 4.e.1, we can see that the transfer numbers to CSLA have been rising mildly, about 10% over the past 3 years. However, one must take into account that we no longer offer the Nursing program. Thus, in our continuing programs transfer enrollment has grown 57% from 2002-2005. We hope the efforts just mentioned will lead to continued rapid growth in this area. Table 5.4.1 shows the transfer student data for CSLA programs

Table 5.4.1 Number of Transfers by CSLA Program by Year

CSLA	F2002	F2003	F2004	F2005
ACTS	4	1	1	1
APMT	5	1	0	0
APPH	5	6	8	7
BIOL	7	11	9	10
CHM	7	6	12	7
COMM	0	0	0	2
CS	2	0	0	0
ESC	3	1	0	0
EVSC	2	3	2	4
HIST	2	1	6	6
MATH	0	16	29	32
NURS*	23	12	3	0
PTC	10	10	7	6
STS	5	9	7	7
Total w/o NURS	52	65	81	82
Total	75	77	84	82
*NURS program has been discontinued				

5.6 Advising [Evaluation from student satisfaction

While the CSLA student satisfaction numbers are nothing to write home about, for undergraduate satisfaction only the school of Architecture ranks lower than CSLA, while for graduate student satisfaction only Architecture and Computing Science have higher satisfaction numbers than CSLA. For the most part, NJIT has a long way to go to increase student satisfaction across almost all colleges and majors. Many of the ideas expounded upon with regard to retention should also help improve student satisfaction. As the facilities and environment on campus improve, we hope student satisfaction ratings will similarly increase.

However, the biggest increases in student satisfaction might come from effective advisement strategies. Good advising will help students plan a course of study that will enable timely graduation. Advisors should make sure that courses students plan to take are those for which they have the necessary pre-requisites and that potential academic problems are addressed early. Advisors should help students understand how their academic preparation will help them in future employment or graduate school and make students aware of opportunities to

present their research and participate in discipline related summer programs. Efforts to achieve these goals should also improve our retention and graduation rates. This important message has been brought to and been embraced by everyone involved in advising in CSLA. Table 5.6.1 shows undergraduate student satisfaction with advising and Table 5.6.2 shows graduate student satisfaction with advising.

Table 5.6.1 Student Satisfaction Advising - Undergraduate Spring 2005

CSLA

Total N=	5	8	4	1	2	9	2	6	2	39
	APPH	BIOL	CHM	EVSC	HIST	MATH	PTC	STS	UND	Total
Availability of academic advisement	3.20	3.71	3.00	4.00	4.00	3.71	2.00	3.60	3.00	3.47
Quality academic advisement	3.40	3.00	2.67	4.00	4.00	3.57	2.00	3.00	2.50	3.16

Table 5.6.2 CSLA Student Satisfaction Advising - Graduate Spring 2005

Total N=	3	3	2	1	1	5	18
	APPH	APST	CHM	EVSC	MATH	PTC	Total
Availability of academic advisement	2.50	4.00	3.50		3.00	3.00	3.29
Quality of academic advisement	2.50	4.50		2.00		3.00	3.18

5.7 Student Quality [Admitted student characteristics]

CSLA currently attracts some very good students to its programs (see table 5.7.1). CSLA's incoming FTFTF population has had average SAT scores in the 1100-1200 range over the past 4 years (since the separation of the College of Computing Sciences). However, the growing need for remedial courses points to the fact that some of the admitted FTFTF and transfer students have deficiencies in their backgrounds that need to be addressed for them to be successful in their chosen NJIT programs. CSLA takes its responsibility in this area very seriously and assigns a great deal of resources to address this issue.

We intend to improve the quality of our student body by making NJIT attractive to high achieving young men and women. We feel that this can be done at the same time as we continue to increase the enrollment and retention in our disciplines. Having greater uniformity of preparation in such higher achieving students may also bring with it pedagogical advantages. Some of the measures that will be used to achieve these goals are:

- Target distinctive career-oriented options for expansion (financial mathematics, math/computational biology, biochemistry, biophysics, optical science, communication).
- Develop, expand and promote pre-professional programs (pre-medical/dental/optometry, pre-law, teacher certification).
- Strengthen: student profile (SAT to 1235), enrollment (+100%), completion rate (to 60%).

Table 5.7.1 Average FTFTF SAT in CSLA programs and totals for CSLA (This data is taken from the FTFTF and SAT data file and has different data from the freshman application, acceptance data used in Table 4.1)

Table 5.7.1 Undergraduate FTFTF by School, SAT and HS Rank

CSLA		F2002	F2003	F2004	F2005
ACTS*	SAT Math	620	0	0	0
	SAT Verbal	490	0	0	0
	SAT Comb	1,110	0	0	0
	HS Rank	62	0	0	0
APMT*	SAT Math	658	0	0	0
	SAT Verbal	560	0	0	0
	SAT Comb	1,218	0	0	0
	HS Rank	43	0	0	0
APPH	SAT Math	685	800	653	669
	SAT Verbal	695	630	573	610
	SAT Comb	1,380	1,430	1,227	1,279
	HS Rank	87	86	73	81
BIOL	SAT Math	611	652	654	616
	SAT Verbal	549	582	599	519
	SAT Comb	1,160	1,234	1,253	1,134
	HS Rank	83	76	78	61
CHM	SAT Math	588	543	563	579
	SAT Verbal	570	523	475	527
	SAT Comb	1,158	1,067	1,038	1,106
	HS Rank	74	81	80	80
COMM	SAT Math	0	0	0	565
	SAT Verbal	0	0	0	505
	SAT Comb	0	0	0	1,070
	HS Rank	0	0	0	79
EVSC	SAT Math	0	610	0	570
	SAT Verbal	0	690	0	610
	SAT Comb	0	1,300	0	1,180
	HS Rank	0		0	
HIST	SAT Math	680	660	0	572
	SAT Verbal	600	560	0	588
	SAT Comb	1,280	1,220	0	1,160
	HS Rank		90	0	67
MATH	SAT Math	0	710	623	663
	SAT Verbal	0	603	501	570
	SAT Comb	0	1,313	1,124	1,233
	HS Rank	0	96	74	87
PTC	SAT Math	567	470	545	0
	SAT Verbal	523	545	550	0
	SAT Comb	1,090	1,015	1,095	0
	HS Rank	52	56	87	0

STS	SAT Math	460	660	490	0
	SAT Verbal	480	635	570	0
	SAT Comb	940	1,295	1,060	0
	HS Rank		34	65	0
UND	SAT Math	580	591	574	565
	SAT Verbal	530	507	530	509
	SAT Comb	1,110	1,099	1,104	1,074
	HS Rank	63	59	49	40
CSLA FTFTF		47	46	55	81
CSLA	SAT Math	597	624	614	601
CSLA	SAT Verbal	546	559	553	538
CSLA	SAT Comb	1119	1183	1167	1139
* program has been discontinued, moved to MATH					

5.8 Diversity – status, goals, metrics, program participation

Diversity and Global Education

NJIT is educating a larger and more diverse group of students than ever before. As our student body continues to become more diverse, we should explore teaching techniques designed to prepare students for increasingly complex and diverse communities and workplaces. With students from so many different backgrounds and the efforts to increase NJIT's visibility throughout the US and around the world, NJIT must take a global, or international, perspective in its approach to education. Students must be engaged to fully understand and appreciate the complexities of the modern world, with its richness of cultural and linguistic diversity. We need to develop approaches to learning and teaching that demonstrate an awareness and sensitivity to this diversity. NJIT must prepare its students for the rapidly changing environment, where international perspectives and the ability to work with and in a range of different cultures, will be highly desirable graduate attributes. At NJIT, we are able to use the diversity of our faculty to inform our teaching and learning and to increase the understanding of and the experiences with cultural diversity among the student body. Students will then be encouraged to explore not only how knowledge is created, but also disseminated and used from a global perspective.

Data for ethnic and gender diversity for NJIT and CSLA for the 2002-5 years, for undergraduate and graduate students are provided below. We list only the percentages, as in this way it is easier to compare the values. Among graduate students, a little over 10% of CSLA graduate students are African American, Hispanic or Native American, similar to the NJIT overall percentage of underrepresented minorities.

On the other hand, in terms of gender, CSLA is well above the rest of NJIT in percentage of female graduate students and this percentage has been steadily growing. Among CSLA undergraduate students about 36% are female, while for all of NJIT the percentage is about 20% female. Among CSLA graduate students,

about 48% are female, while for all of NJIT the percentage of females is about 30%.

Given these statistics, it appears that CSLA is doing well in the diversity category, but we intend to continue our efforts in this area and further improve, using strategies describe above (in Section 4. d.) to increase the diversity of the CSLA cohort of students.

Table 5.8.1 Undergraduate gender diversity

	F2002		F2003		F2004		F2005	
CSLA	Female	Male	Female	Male	Female	Male	Female	Male
ACTS*	38%	63%	100%	0%	100%	0%	100%	0%
APMT*	41%	59%	100%	0%				
APPH	13%	88%	12%	88%	14%	86%	12%	88%
BIOL	54%	46%	55%	45%	57%	43%	59%	41%
CHM	47%	53%	47%	53%	42%	58%	42%	58%
COMM							29%	71%
CS	0%	100%						
ESC	50%	50%	50%	50%				
EVSC	50%	50%	63%	38%	50%	50%	55%	45%
HIST	43%	57%	54%	46%	41%	59%	17%	83%
MATH			33%	67%	30%	70%	37%	63%
PTC	27%	73%	27%	73%	20%	80%	28%	72%
STS	33%	67%	41%	59%	39%	61%	44%	56%
UND	18%	82%	19%	81%	5%	95%	8%	92%
Total	35%	65%	37%	63%	35%	65%	36%	64%
NJIT Total	21%	79%	21%	79%	20%	80%	19%	81%

* ACTS and APMT have migrated to MATH; The discontinued Nursing program has been removed

Table 5.8.2 Undergraduate ethnic diversity

	F2002							
CSLA	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
ACTS*	25%	38%	6%	13%	0%	0%	19%	100%
APMT*	14%	16%	0%	16%	0%	22%	32%	100%
APPH	0%	13%	0%	6%	0%	31%	50%	100%
BIOL	16%	41%	5%	8%	0%	8%	22%	100%
CHM	27%	7%	0%	0%	0%	27%	40%	100%
COMM								
EVSC	20%	30%	0%	20%	0%	10%	20%	100%
HIST	7%	14%	7%	7%	0%	29%	36%	100%
MATH								
PTC	35%	12%	4%	15%	0%	12%	23%	100%
STS	33%	17%	0%	0%	0%	17%	33%	100%
UND	4%	38%	0%	9%	0%	16%	33%	100%
Total	16%	23%	2%	10%	0%	15%	33%	100%
NJIT Total	16%	25%	2%	10%	0%	16%	30%	100%

* APMT and ACTS migrated to MATH; discontinued programs NURS, CS, ESC not included

Table 5.8.2 (cont.)
F2003

CSLA	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
ACTS	0%	0%	100%	0%	0%	0%	0%	100%
APMT	0%	100%	0%	0%	0%	0%	0%	100%
APPH	0%	12%	6%	6%	0%	29%	47%	100%
BIOL	17%	49%	2%	11%	0%	4%	17%	100%
CHM	20%	7%	7%	7%	0%	33%	27%	100%
COMM								
EVSC	13%	25%	0%	13%	0%	13%	38%	100%
HIST	8%	8%	0%	8%	0%	38%	38%	100%
MATH	8%	18%	1%	24%	0%	14%	34%	100%
PTC	33%	10%	3%	13%	0%	10%	30%	100%
STS	24%	18%	0%	12%	0%	18%	29%	100%
UND	6%	48%	0%	10%	0%	3%	32%	100%
Total	14%	25%	2%	14%	0%	14%	30%	100%
NJIT Total	10%	22%	6%	12%	0%	16%	34%	100%

* APMT and ACTS migrated to MATH; discontinued programs NURS, CS, ESC not included

Table 5.8.2 (cont.)
F2004

CSLA	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
ACTS	0%	0%	100%	0%	0%	0%	0%	100%
APMT								
APPH	0%	18%	5%	5%	0%	23%	50%	100%
BIOL	14%	51%	3%	8%	0%	11%	14%	100%
CHM	8%	25%	13%	17%	0%	17%	21%	100%
COMM								
CS								
ESC								
EVSC	25%	25%	0%	0%	0%	0%	50%	100%
HIST	12%	12%	0%	0%	0%	24%	53%	100%
MATH	13%	25%	3%	17%	0%	10%	31%	100%
NURS	0%	25%	0%	0%	0%	0%	75%	100%
PTC	28%	12%	0%	24%	0%	8%	28%	100%
STS	22%	28%	0%	17%	0%	11%	22%	100%
UND	5%	25%	5%	15%	0%	15%	35%	100%
Total	13%	29%	4%	13%	0%	13%	29%	100%
NJIT Total	10%	21%	6%	13%	0%	15%	34%	100%

* APMT and ACTS migrated to MATH; discontinued programs NURS, CS, ESC not included

Table 5.8.2 (cont.)
F2005

CSLA	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
ACTS	0%	0%	0%	0%	0%	0%	100%	100%
APMT								
APPH	0%	20%	4%	4%	0%	8%	64%	100%
BIOL	11%	43%	6%	5%	0%	16%	18%	100%
CHM	13%	25%	4%	13%	0%	17%	29%	100%
COMM	43%	0%	0%	0%	0%	0%	57%	100%
EVSC	18%	18%	9%	0%	0%	9%	45%	100%
HIST	13%	13%	0%	8%	0%	21%	46%	100%
MATH	11%	22%	4%	16%	1%	13%	32%	100%
PTC	17%	6%	0%	33%	0%	6%	39%	100%
STS	0%	31%	13%	13%	0%	6%	38%	100%
UND	3%	35%	0%	11%	3%	16%	32%	100%
Total	10%	27%	4%	11%	1%	14%	34%	100%
NJIT Total	11%	20%	6%	13%	0%	15%	35%	100%

* APMT and ACTS migrated to MATH; discontinued programs NURS, CS, ESC not included

Table 5.8.3 Graduate gender diversity

	F2002		F2003		F2004		F2005	
CSLA	Female	Male	Female	Male	Female	Male	Female	Male
APMT*	38%	63%	36%	64%	22%	78%	22%	78%
APPH	11%	89%	19%	81%	24%	76%	24%	76%
APST*	75%	25%	57%	43%	69%	31%	55%	45%
BIOL	50%	50%	50%	50%	33%	67%	60%	40%
CHEM	53%	47%	36%	64%	60%	40%		
CHM			100%	0%	63%	38%	71%	29%
EPS	42%	58%	58%	42%	60%	40%	45%	55%
EVSC	43%	57%	47%	53%	50%	50%	51%	49%
HIST			0%	100%				
MATH	33%	67%	29%	71%	26%	74%	31%	69%
OSIH	0%	100%	0%	100%	0%	100%		
PTC	70%	30%	74%	26%	53%	47%	64%	36%
Total	41%	59%	45%	55%	45%	55%	48%	52%
NJIT Total	29%	71%	31%	69%	30%	70%	29%	71%

*APMT and APST have migrated to MATH; discontinued programs BINF, CBIO not included

Table 5.8.4 Graduate ethnic diversity

CSLA	F2002							
	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
APMT*	25%	25%	13%	13%	0%	0%	25%	100%
APPH	3%	0%	69%	11%	0%	14%	3%	100%
APST*	0%	25%	38%	6%	0%	25%	6%	100%
BIOL	0%	0%	100%	0%	0%	0%	0%	100%
CHEM	13%	7%	53%	7%	0%	0%	20%	100%
CHM								
EPS	11%	11%	0%	0%	0%	42%	37%	100%

EVSC	4%	4%	20%	6%	0%	18%	49%	100%
HIST								
MATH	0%	4%	74%	0%	0%	11%	11%	100%
OSIH	0%	0%	0%	20%	0%	20%	60%	100%
PTC	26%	9%	4%	0%	0%	26%	35%	100%
CSLA Total	7%	7%	37%	5%	0%	18%	26%	100%
NJIT Total	6%	15%	39%	5%	0%	12%	23%	100%

*APMT and APST have migrated to MATH; discontinued programs BINF, CBIO not included

Table 5.8.4 (cont.)

CSLA F2003

	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
APMT*	18%	18%	18%	18%	0%	0%	27%	100%
APPH	0%	11%	62%	5%	0%	11%	11%	100%
APST*	10%	29%	29%	5%	0%	14%	14%	100%
BIOL	0%	0%	100%	0%	0%	0%	0%	100%
CHEM	21%	29%	29%	0%	0%	0%	21%	100%
CHM	0%	0%	50%	0%	0%	0%	50%	100%
EPS	8%	8%	4%	0%	0%	31%	50%	100%
EVSC	8%	4%	25%	6%	0%	17%	42%	100%
HIST	0%	0%	0%	0%	0%	0%	100%	100%
MATH	0%	6%	71%	0%	0%	9%	14%	100%
OSIH	0%	0%	0%	0%	0%	0%	100%	100%
PTC	29%	6%	0%	0%	0%	11%	54%	100%
CSLA Total	10%	10%	33%	3%	0%	13%	31%	100%
NJIT Total	7%	18%	36%	5%	0%	11%	25%	100%

*APMT and APST have migrated to MATH; discontinued programs BINF, CBIO not included

Table 5.8.4 (cont.)

CSLA F2004

	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
APMT*	11%	0%	22%	22%	0%	22%	22%	100%
APPH	0%	9%	64%	9%	0%	7%	11%	100%
APST*	12%	35%	31%	4%	0%	8%	12%	100%
BIOL	0%	0%	100%	0%	0%	0%	0%	100%
CHEM	20%	30%	0%	0%	0%	0%	50%	100%
CHM	0%	0%	88%	0%	0%	0%	13%	100%
EPS	4%	4%	8%	0%	0%	32%	52%	100%
EVSC	5%	3%	40%	0%	0%	13%	40%	100%
HIST								
MATH	0%	3%	84%	3%	0%	3%	6%	100%
OSIH	0%	0%	0%	0%	0%	0%	100%	100%
PTC	24%	9%	0%	0%	0%	9%	59%	100%
CSLA Total	7%	9%	40%	3%	0%	10%	29%	100%
NJIT Total	7%	17%	38%	5%	0%	8%	24%	100%

*APMT and APST have migrated to MATH; discontinued programs BINF, CBIO not included

Table 5.8.4 (cont.)

CSLA	F2005							
	Afr. Amr.	Asn. Amr.	Foreigner	Hisp.	Nat. Amr.	Unknown	White	Total
APMT*	11%	33%	11%	22%	0%	11%	11%	100%
APPH	0%	9%	64%	9%	0%	3%	15%	100%
APST*	15%	30%	27%	0%	0%	12%	15%	100%
BIOL	20%	40%	20%	0%	0%	20%	0%	100%
CHEM								
CHM	0%	12%	59%	6%	0%	0%	24%	100%
EPS	0%	5%	5%	5%	0%	20%	65%	100%
EVSC	8%	12%	27%	2%	0%	10%	41%	100%
HIST								
MATH	0%	6%	81%	0%	0%	6%	6%	100%
OSIH								
PTC	14%	7%	5%	2%	0%	18%	55%	100%
CSLA Total	7%	13%	35%	4%	0%	11%	31%	100%
NJIT Total	7%	16%	38%	5%	0%	8%	25%	100%

*APMT and APST have migrated to MATH; discontinued programs BINF, CBIO not included

6. Academic Personnel

The breakdown of courses taught by faculty, special lecturers, adjuncts, and teaching assistants follows. The workload is also broken down in terms of undergraduate and graduate courses.

6.1 Instructional staff [Course distribution tool and faculty load report]

CSLA currently has 100 tenure-track faculty. The College also has 35 special lecturers, and a full-time staff of 27.

Ultimately, our hiring decisions are based on our curricula, research objectives, and the synergies we have with the rest of the university. Thus, before any assessment of future staffing requirements is made, we must have a good sense of any projected changes to our curricula and educational objectives, including any program restructuring, new program development and research objectives. It is important to anticipate the kinds of faculty expertise that such initiatives will demand. When predicting future staffing requirements, we will identify current and potential future vacancies based on known facts and probabilities about current staffing situations.

6.1.1 Course assignments [lower division, upper division, graduate]

Course assignments are made by the chair of each department based on availability and qualifications of faculty members.

6.1.1.1 Individual

Faculty teaching varies based on research and service activity. A more standardized system that would ensure coverage and fairness is being implemented based on the earlier campus discussions regarding the Faculty Workplan (and its successors).

For a summary of course distribution by department see Appendix C.

6.1.1.2 By position [tenure track, special lecturer, adjunct]

While in theory we would love to have all sections of all courses taught by tenure track faculty, this is simply not economically feasible. Special lecturers have an exclusively teaching role and are typically assigned to undergraduate courses. For flexibility, curricular needs, and economic reasons, adjuncts are also used. Adjuncts primarily teach introductory courses. In order to keep class sizes at a modest level, especially in remedial courses, where it has been demonstrated that small class size is necessary for quality student performance, departments with significant remedial course enrollments (Humanities and Mathematical Sciences in particular) have a larger fraction of sections taught by adjuncts and special lecturers.

6.1.1.3 Use of students - TA assignments

The basis on which TAs are assigned is determined by each department based on recitation sessions, laboratory, and learning center needs.

For a summary of TA involvement by department see Appendix C.

6.1.2 Assessment and continuous improvement [Course eval. and dist.]

6.1.2.1 Balance among position/rank

As a matter of principle, position and rank should not influence teaching assignments. It is important to assign course instructors based on a "best fit' policy. However, it is equally important that students interact with faculty from all ranks and as many areas of specialization as possible. It is important to note that we do place special emphasis on assigning instructors in first-year course.

6.1.2.2 Metrics and goals

Faculty teaching load should be greatly influenced by research funding, research activity and administrative/service duties. As a general rule, all faculty members should teach at least one course each semester to remain connected to this important university activity.

6.1.3 Other assignments

Of course, there is so much more that needs to be done to make a department function well than simply assigning courses to be taught. Other roles include: curriculum development, student advising, course coordination (for common courses), recruitment of new undergraduate and graduate students, liaison with the library, PSA, Faculty Council and so on. All these roles take time and must be considered in making teaching assignments.

7. Research Personnel [HR staff data from IRP]

CSLA boasts a majority of very accomplished faculty members in all of its departments who will serve as a foundation and catalyst for achieving excellence in education and research. The College must continue to increase its efforts to recruit, retain, support, and develop a world-class faculty, with a particular emphasis on recruiting new faculty whose diversity reflects that of the CSLA student population. Although a significant proportion of the CSLA faculty is research-active, this proportion needs to be increased. New faculty must be added in order to achieve critical masses of topnotch researchers and teachers in several key areas of current and possible future strength. More support will be needed to optimize faculty engagement in a full range of activities including research/scholarship, teaching and service, so that CSLA can reach a nationally competitive level.

CSLA faculty members are actively involved in research. The College's notable research specialties include: in Mathematical Sciences/Biological Sciences - mathematical biology, fluid dynamics, wave propagation, combustion, statistics, applied analysis, bioinformatics, computational neuroscience; in Physics – solar and terrestrial physics, optical science, laser, condensed matter, microelectronics; in Chemistry and Environmental Science - kinetics, thermochemistry, atmospheric/plasma/analytical chemistry, sensor assemblies, nanotubes, fuel cells, green liquids, bio-catalysis, computational drug interactions, supercritical fluids, particle coating, water quality economics, watershed management, coastal ecosystem, industrial ecology, environmental policy; in Humanities - technical communication and writing, professional ethics, environmental philosophy; in History - history of technology, environment, medicine and communication.

Table 7.1 CSLA Research Expenditures

Year	Expenditures (in millions of $)
FY 2004	7.2
FY 2005	7.7
Fall 2006	4.1

A short term hiring plan has been developed to address specific CSLA priorities, with implementation starting in AY 05-06. This plan should immediately elevate the College's academic and research roles at NJIT and visibility in New Jersey and across the nation. The implementation of the hiring plan takes into consideration the limitations of the current economic situation. While such a plan cannot address all long term hiring needs within the College, it delineates a rational and concrete basis for the growth and visibility of CSLA's departments and programs. The plan takes into consideration our GUR mission, identifies areas for CSLA growth, builds on NJIT's traditional strengths, and implements the university's strategic plan.

7.1 Faculty involvement

We present in Table 7.1.1 the number of faculty at each level in each of our departments.

Table 7.1.1 Number/Rank of Faculty/Instructional Staff in CSLA Departments/Divisions

Dept or Division	Dist Prof	Prof	Research Prof	Assoc Prof	Asst Prof	Lect/ Spec Lect	Project/ Program Director	Adjunct	Res/Lab Staff	Total
Chemistry and Env. Science	2	4	1	2	5	2		18	1	17
History	1	1	0	0	3	1		3		6
Humanities		6		6	3	15	6	22		58
Mathematical Sciences*	3	14	6	18	13	9	3	21		87
Physics	3	7	11	2	5	11		7	3	42
Totals	9	32	18	28	29	38	9	71	4	

*Biology entries are included within Mathematical Sciences.

Table 7.1.2 Faculty involvement

Department or Division	Faculty involvement
Biology	<u>Distinguished Professor</u> G. Miller Jonakait Neurobiology/Neuroimmunology. Dr. Jonakait's recent work has focused on the consequences to the developing brain of maternal inflammation. In particular, she has focused on acetylcholine-containing (cholinergic) neurons of the basal forebrain. She has found in culture that excessive inflammation promotes excess cholinergic differentiation. This has extreme relevance to the etiology of the neuron-developmental disorders associated with autism since autistic subjects exhibit both brain inflammation and excess numbers of cholinergic neurons. Her prior work has advanced the concept that molecules from the immune system could affect neuropeptides in the nervous system, and reversely, that neuropeptides affect immune system function. <u>Associate Professor</u> Jorge Golowasch Neuronal Plasticity. Jorge Golowasch is currently studying the role of gap junctions in the generation of activity by neurons and neuronal networks of the STG. He uses computational, electrophysiological and analytical techniques to examine how gap junctional currents interact with other ionic currents expressed by the connected neurons and how these interactions depend on current flow along the intricate branches of a neuronal dendritic tree to produce electrical activity. He is also currently screening several neuropeptides known to have short-term

	neuromodulatory effects for their possible involvement in trophic regulation of dissociated adult neurons in cultured and in long term organotypical culture. So far he has identified one peptide family with putative trophic function and is continuing with this screen. He plans to then study the intracellular signaling pathways involved in these effects, as well as their function in the adult and in development. Farzan Nadim Synaptic Dynamics. Farzan Nadim's work has helped identify new mechanisms through which fast and slow oscillatory networks coordinate their activities. He combines computational, analytical and experimental techniques towards understanding how properties of neurons and their synaptic dynamics shape the output of oscillatory neuronal networks. He studies the generation of rhythmic motor patterns in the crustacean stomatogastric nervous system (STNS). <u>Assistant Professor</u> Gareth J. Russell Population Dynamics. Gareth Russell's research areas are applied spatio-temporal Population Dynamics; statistical methods for conservation; community dynamics incorporating evolution; automated monitoring; and coexistence ecology: the ecology and management of non-natural ecosystems. Ongoing projects are Demography of the Cape Sable seaside sparrow in the Everglades NP, Florida; Movement and habitat selection of African elephants; the invasion dynamics of Asian long-horned beetle in New York City and New Jersey; timing of the end-pleistocene megafaunal extinctions; online calculation tools for conservation; use of information-based statistics in ecology; ecological game theory; and three-dimensional object recognition for automated species identification.
Chemistry and Environmental Science	<u>Distinguished Professor</u> Joe Bozzelli Dr. Bozzelli's research includes studies involving gas phase chemical kinetics aimed at understanding elementary reaction paths and determining rate constants for reactions important in atmospheric photochemistry, hydrocarbon oxidation, and chlorocarbon reaction systems. Gas chromatography, GC/mass spectrometry and other Conventional analytical techniques are used to monitor reactant and product profiles from flow reactor experiments. Laser induced fluorescence and absorption is available to study transient species such as OH radical, in flames and flow reactors. Ab initio and semi-empirical calculations are used to determine thermochemical properties. Carol Venanzi Dr. Venanzi's research involves the application of computational chemistry and molecular modeling techniques to problems in drug design, DNA-ligand interactions, biomimetic chemistry, and chemoreception. In all these applications, a combination of quantum mechanics is used, as are, molecular mechanics, molecular dynamics, and computer graphics to analyze the relationship of molecular structure to biological function.

	Full Professor Jim Grow Dr. Grow's research interests include the Kinetic and mechanistic study of low pressure chemical vapor deposition of Si-C-N-B based films; the development of mask menbrane materials for x-ray lithography; mechanical and chemical characterization of thin films using nano-indentation, x-ray diffraction, and x-ray photoelectron spectroscopy. Tamara Gund Dr. Gund's research includes the development of a solvent database for pure and mixed solvents; Modeling of receptors and their ligands, especially the acetylcholine (muscarainic and nicotinic), t he sigma and PCP receptors and the pleasure receptor (cocaine and other abusive drugs); modeling of the interaction between antimalarial agents such as artemisinin (qinghaosu) with hemin; calculation of preferred structures of biologically and theoretically important molecules. Lev Krasnoperov Dr. Krasnoperov's research interests include: Chemical kinetics and thermodynamics of gas phase reactions. Thermodynamics of free radicals and strengths of chemical bonds; Kinetics of particle nucleation and growth; reactions in non-thermal plasmas; supercritical fluids as process media; and reactions, film deposition and nanoparticle formation from supercritical solutions. Somenath Mitra Dr. Mitra's current research focuses on sensors and analytical instrumentation; MEMS, lab-on-a-chip, microfluidics; thin-film sensors and devices using conducting and semiconducting polymers; and instrumentation/devices based on membrane separation. Additional research areas include nanotechnology, carbon nanotube synthesis and functionalization. Associate Professor Sergiu Gorun Dr. Gorun's research includes bioinspired Artificial Enzymes: rational design, structures, catalysis, biomedical and materials science applications and Structural Isotope Effects Nancy Jackson Dr. Jackson's research can be broadly categorized into three areas. The first area focuses on beach processes and management in estuarine and sheltered coastal systems. A second area of interest is aeolian sediment transport across beaches. This area has expanded to sediment transport within dunes. A third area, that is a component of all of her research endeavors, focuses on coastal management including the effects of shore protection strategies on beach and dune environments.

	Assistant Professor Maurie Cohen Dr. Cohen's research is located at the intersection of the environmental social sciences and environmental policy. Primary areas of activity are the formulation of pragmatic initiatives to foster more sustainable consumption practices, the conceptualization and design of future-oriented mobility systems, and the politics of environmental expertise. He serves as the chair of the Policy and Research Committee of the Environment and Technology Section of the American Sociological Association and is the editor of the new e-Journal entitled *Sustainability: Science, Practice, and Policy* (http://ejournal.nbii.org). Edgardo Farinas The central aim of Dr. Farinas' research is to develop methodologies and "rules" for enzyme design, and apply these methods to efficiently create novel and practical biocatalysts. His current research interest is in engineering proteins using directed evolution and rational approaches with goals that include developing high-throughput screening technologies to assay mutant enzyme libraries to discovery novel biocatalyst, combine rational and directed evolution approaches to create de novo enzymes, metabolic pathway engineering in bacteria, novel protein display technologies, and incorporation of nonnatural amino acids in proteins. Sanjay Malhotra Dr. Malhotra's research focuses in several areas including: Synthesis and Design of novel ionic liquids; Metal and Bio-catalysis in Ionic Liquids; Organic Synthesis; Asymmetric Catalysis; Functionalization of nanotubes and nanoparticles; Chemical and Bio-sensors; Nanomaterials. Zeyuan Qiu Natural resources and environmental economics. Conducts research in non-market evaluation of natural resources, environmental policy analysis, integrated watershed management, environmental risk analysis and integration of biophysical simulation, economic modeling and geographic information systems for resource management. Recent research focuses on the close land-water connections and evaluates the technical, social, economic and institutional factors that affect protection and preservation of hydrologically sensitive areas in landscapes and their policy implications for watershed management, stormwater management and smart growth in environmentally fragile rural-urban interfaces. Liping Wei Dr. Wei's research includes: Trace metal nutrition and pollution in aquatic environment; the physiology and biochemistry of metal and other nutrient stress in marine phytoplankton; biogeochemical cycling of metals in marine environment and bioremediation. Special Lecturers Frank Ellis Dr. Ellis is involved in chemistry education and has research interests in

	alternative energy production, energy storage, and reduction of energy needs. In his work he uses knowledge from material science, chemistry, physics, mathematics, mechanical engineering, and fluid mechanics. He has worked on the deposition and characterization of thin film coatings for amorphous silicon solar cells, low emissivity glass, and electrochromic devices. He has also developed new deposition processes and designed research and production equipment to lower costs and improve performance. William Skawinski Dr. Skawinski is involved in chemistry education and his research interests include characterization of interactions between biological macromolecules (proteins and nucleic acids), and small ligand molecules, such as drugs and toxins. Application of spectroscopic and computational techniques to the investigation of intermolecular interactions. Identification of structural features of molecules responsible for biological activity. Application of rapid prototyping techniques for the construction of unique molecular models designed as research and teaching tools. <u>Research Professor</u> Zafar Iqbal Current research in Prof Iqbal's group is focused in the following four areas: scaled up thermal and plasma-enhanced growth and growth mechanisms of single wall carbon nanotubes and in-situ grown nanotube/metal, diamond and polymer composites; Chemical and biochemical functionalization of carbon nanotubes using electrochemical and microwave-assisted techniques (in collaboration with Prof. Mitra's group); hydrogen storage in electrochemically modified carbon nanotubes and biofuel cells with enzyme-functionalized nanotube/porous silicon electrodes; and functional nanotubes and nanotube arrays for bio-applications and for surface-enhanced single molecule Raman sensing.
History	<u>Distinguished Professor</u> Richard B. Sher, NJIT Chair History of Communication and Technology, especially the History of Books; The Enlightenment, especially in Scotland. Richard Sher is an internationally known scholar of the Enlightenment and the history of print culture. He has won Guggenheim, NEH, and Spencer Foundation fellowships and has published widely with major scholarly presses in the United States and the United Kingdom, including two books with Princeton University Press. In fall 2006 the University of Chicago Press will publish his latest book, *The Enlightenment and the Book: Scottish Authors and Their Publishers in Britain, Ireland, and America*. <u>Full Professor</u> John E. O'Connor Film/Television and History; Colonial and Early National American History John O'Connor is renowned as the co-founder of the journal *Film and History* and one of the originators of the entire field of film and television studies in

	relation to history. He has written and edited six books and is the only living person ever to have a prize named after him by the American Historical Association: the John E. O'Connor Film and History Prize, established "in recognition of his exceptional role as a pioneer in both teaching and research regarding film and history" (AHA website). <u>Assistant Professor</u> Neil Maher 20th-Century American Environmental, Social, and Political History; History of Technology and Medicine; Landscape Studies. With the publication by Rutgers University Press of his edited volume *New Jersey's Environments: Past, Present, and Future* in January 2006, Neil Maher has begun to achieve national distinction in the field of American environmental history. Later in 2006 Oxford University Press will publish his important book, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement, 1929-1942*. Stephen Pemberton 20th-Century American History of Medicine, Biomedical Science, and Technology; History of Public Health. Although only in his second year at NJIT, historian of medicine Stephen Pemberton has already co-authored (with Keith Wailoo) an important new book that Johns Hopkins University Press will publish in April 2006: *The Troubled Dream of Genetic Medicine: Ethnicity and Innovation in Tay-Sachs, Cystic Fibrosis, and Sickle Cell Disease*. In addition, Stephen has a second book of his own under contract with Johns Hopkins University Press: *Passport to Freedom*, which deals with the history of hemophilia. <u>Special Lecturers</u> Kevin Gumienny Early American History; History of Science and Technology. As a Special Lecturer, historian of science Kevin Gumienny has a heavy teaching load that leaves little time for scholarship. However, he continues to make contributions to the department's mission, such as the invited lecture he delivered in November 2005 at the Morris County Heritage Commission's conference "From Telegraph to Telstar: The History of Communications Technology in Morris County."
Humanities	<u>Full Professor</u> Patrick Beaton Economics, statistical evaluation of social programs, globalization. Norbert Elliot Theory and practice of writing assessment, the theory and practice of communication, the theory and history of environmental rhetoric, cognitive complexity theory, technology and education, and policy.

	Eric Katz Environmental ethics, philosophy of technology, Holocaust studies, ethics of engineering & technology Robert Lynch Shakespeare on film, literature and film, technical communications, writing/program assessment David Rothenberg Nature, technology, and music in philosophy, literature, and practice Karl Schweizer War and society, diplomacy and statecraft <u>Associate Professor</u> Nancy Coppola Technology Transfer and Technical Communication, Technology Enhanced Teaching and Learning, Technical Communication and Environmental Rhetoric Robert Friedman 19th-Century American Studies; Science, Technology and Society; Philosophy of Science and its relationships with literary practice. Burt Kimmelman Modern and Postmodern Literature, especially Poetry, Interdisciplinary Medieval Studies, Technology and Culture, especially Aesthetics, Textual Scholarship; Communications Technology and Epistemology Nancy Steffen-Fluhr Drama, Science Fiction, Early 20th-Century Detective Fiction; Women's Studies Nikki Stiller Poetry, 20th Century Comic Tradition Norman Tobias Ancient Empires, Hellenistic States <u>Assistant Professor</u> Christopher Funkhouser Electronic Media and English Studies, Computer Writing and Criticism, Hypertext Pedagogy, Electronic Publishing, Technology and Society, Digital Communications and Design, Twentieth Century Literature, Poetry Elizabeth Hodge Philosophy of science and medicine, ethics and social justice Carol Johnson The History of Technical Communication; Assessment of Writing

Mathematical Sciences	Distinguished Professor Vladislav V. Goldberg Dr. Goldberg received the Outsatnding Professional Development by a Tenured Faculty Member Award in 1997-98. In 1998-99 he received the Excellence in Graduate Instruction Award. The research of Vladislav V. Goldberg is in the field of differential geometry: projective differential geometry, conformal differential geometry, and the theory of webs. In the first field, he studies submanifolds with degenerate Gauss maps in a multidimensional projective space; in the second one, he studies the theory of lightlike submanifolds; and in the third one, his studies concern the local theory of webs and the algebraic aspects of this theory. His current projects include an investigation of the structure of varieties with degenerate Gauss maps and their singularities, finding conditions of linearizability of d-webs on a two-dimensional differentiable manifold, and writing the book Differential Geometry of Varieties with Degenerate Gauss Maps for Springer-Verlag. Gregory A. Kriegsmann Foundation Chair. Dr. Kriegsmann received the Harlan J. Perlis Research Award in 1994-95. He is presently the Vice President of Publications for SIAM, a Fellow of the Institute of Mathematics and its Applications, and a Fellow of the Acoustical Society of America. The research of Gregory A. Kriegsmann has focused on the modeling, analysis, and numerical simulations of physical problems arising in industrial and technological settings. His studies in microwave heating of materials describe the nonlinear interaction between electromagnetic waves and materials, and the effect of cavity geometry. His research on acoustic and electromagnetic scattering theory includes applications to radar, structural acoustics, and acoustics in flows. His studies in circuit theory cover the design and analysis of oscillators and power supplies. His current work is focused on microwave assisted chemical vapor infiltration, thermal patterns in microwave heating experiments, and microwave assisted ceramic sintering. Full Professor Daljit S. Ahluwalia Department Chair. Currently on assignment as Dean in the College of Computing Sciences In 2002-03 Dr. Ahluwalia was awarded Overseer's Award for Public and Institute Service. Research of Dr. Ahluwalia is in the field of applied mathematics, mainly in the areas of asymptotics and wave propagation. Using analytic and asymptotic methods, he has addressed a wide range of phenomena including scattering, diffraction, reflection, guided waves, dispersion and shock waves. Applications of this work include ocean acoustics, water waves, electromagnetics, and elastic waves. Roman Andrushkiw The research of Roman Andrushkiw has focused on the spectral theory of operator-valued functions and the analysis of free boundary problems, with application to numerical modeling in the area of cryosurgery and medical diagnostics. His study of operator-valued functions deals with spectral theory and approximation methods for eigenvalue problems that depend nonlinearly on

	the spectral parameter. His study of Stefan-type free boundary problems is concerned with modeling of heat transfer phenomena in the freezing of living tissue, involved in cryosurgery. His current projects include the development of a variational method for approximating the eigenvalues of polynomial differential operator pencils, and the study of a pattern recognition algorithm in medical diagnostics related to breast cancer. Manish C. Bhattacharjee Research of Manish Bhattacharjee has focused on applying reliability theoretic ideas to the modeling and study of non-negative variables and processes in time to better understand the probabilistic structure of particular distributions of interest in various application settings. Additionally, his research interest and work includes stochastic orders to investigate aging and degradation concepts. Current research includes work on some natural strengthenings of the 'decreasing failure rate' (DFR) property via 'completely monotone functions' and stochastic comparisons of branching processes. Denis Blackmore Dr. Blackmore received the Harlan J. Perlis Research award in 1992-03. Dynamical systems (nonlinear dynamics) theory is a rich amalgam of techniques from algebra, analysis, chaos theory, differential equations, differential geometry, differential topology, fractals, geometry, singularity theory, and topology, and has important applications in every branch of science and engineering. Denis Blackmore's research is primarily in the theory and applications of dynamical systems and closely related fields. He has studied a plethora of applications in such areas as acoustics, automated assembly, biological populations, computer aided geometric design, fluid mechanics, granular flows, plant growth (phyllotaxis), relativistic and quantum physics, and rough surface analysis. His theoretical work includes fundamental results on solution properties and integrability of differential equations, and analysis of hypersurface singularities. Among his current projects are acoustically generated particle flows, biocomplexity of marshes, competing species dynamics, dynamical models in economics, integrability of infinite-dimensional dynamical systems (PDEs), particle dynamics, phyllotaxis, virtual reality systems, vortex dynamics, and weak shock waves. Amitabha Bose He is the recipient of Student Senate Best Teaching Award. He also received the Albert Dorman Honors College Excellence in Honors Teaching Award. The research of Amitabha Bose focuses on the applications of dynamical systems to mathematical neurophysiology. His studies in neurophysiology include modeling sleep rhythms in the thalamocortical system, phase precession of hippocampal place cells, and the development of rigorous mathematical techniques to analyze such problems. His current projects include modeling phase maintenance in the pyloric network of crustaceans, persistent activity in cortical circuits and rhythmogenesis in frog ventilatory systems. Jonathan H. C. Luke The research of Jonathan H. C. Luke has focused on the modeling and analysis of physical problems primarily in the areas of low-Reynolds-number fluid dynamics and wave propagation in complex media. His studies in

	sedimentation theory cover the topics of velocity fluctuations, renormalization, the method of reflections, cluster dynamics, and variational and numerical methods. His studies of electromagnetic waves in highly dispersive media mainly concern energy deposition and numerical methods. His current projects include analysis of the stability of numerical implementations of no-slip boundary conditions for the Navier-Stokes equations in streamfunction-vorticity form, simulation and analysis of energy deposition from electromagnetic waves in dispersive materials, and effective boundary conditions for heating and scattering problems in microwave cavities. Petronije Milojevic The research of P.S. Milojevic is focused on studying semilinear and (strongly) nonlinear operator equations using a combination of topological, approximation, and variational methods and applications to ordinary and partial differential equations. He has developed various fixed point results for condensing and A-proper maps. His studies of semilinear operator equations with monotone and (pseudo) A-proper maps involve nonresonance and resonance problems with Fredholm and hyperbolic-like perturbations of singlevalued and multivalued nonlinear maps, and Hammerstein equations. He has widely applied these abstact theories to BVPs for (contingent) ordinary and elliptic PDEs, to periodic and BVPs for semilinear hyperbolic and parabolic equations and to nonlinear integral equations. His study of nonlinear and strongly nonlinear operator equations is concerned with the existence and the number of solutions of such equations involving condensing, monotone, and various types of approximation maps. His current research deals with Hammerstein equations and weakly inward A-proper and pseudo A-proper maps and applications to differential and integral equations. Robert M. Miura Acting Chair. Dr. Miura has been selected to receive the Leroy P. Steele Prize for Seminal Contribution to Research from the American Mathematical Society. This award is one of the most prestigious prizes in the field of mathematics. It is awarded for work that has proved to be of fundamental or lasting importance in its field. Dr. Miura has been elected as a Fellow to the American Association for the Advancement of Sciences (AAAS), and he is a Fellow of the Royal Society of Canada. The research of Robert M. Miura covers several areas in mathematical physiology, especially in neuroscience. The techniques used are mathematical modelling, mathematical analysis, approximation methods, and numerical simulations. His research on excitable biological cells, including neurons, cardiac cells, and pancreatic beta-cells, is aimed at understanding electrical effects on cell function and signalling. These studies involve detailed investigations of membrane electrical properties, subthreshold resonance, stochastic resonance, signal propagation on dendrites, and mechanisms leading to bursting electrical activity. His studies on spreading cortical depression, and more generally intercellular communication via ion flows, include analysis and simulations of partial differential equation models. Diffusion of ions in the brain is studied using the lattice Boltzmann method. Demetrios T. Papageorgiou Dr. Papageorgiou received the Harlan J. Perlis Research Award in 2002-03. He is the Co-Editor in Chief of the IMA Journal of Applied Mathematics, Oxford,

	U.K. The research of Demetrios T. Papageorgiou focuses on the modeling, analysis, and computation of physical and technological problems that involve fluid dynamics and aerodynamics. His studies in surface tension driven flows cover the stability, dynamics, and breakup of single and compound liquid jets, both in the presence and absence of surface active agents, which affect interfacial tension. Analysis of finite-time-singularities has been used to motivate experiments for rheological measurements. His studies in bubble dynamics are a theoretical and experimental collaborative research effort to control the drag on rising bubbles using surfactants. Current projects include jet and bubble dynamics, nonlinear stability of core-annular flows when surfactants are present, nonlinear stability of electrified liquid films, and study of viscous flows in pulsating channels or tubes by construction of Navier-Stokes solutions both numerically and analytically with particular emphasis on chaotic regimes and their influence on applications. Manuel Perez The research of Manuel Perez is in the areas of heat transfer, drying of porous media, expert systems, medical diagnosis by computer, and mechanical properties of fibrous webs. He is now working on survival studies of prostate cancer patients, and on evaluating the efficacy of surgical procedures and radiation treatment for various stages of the disease. Michael Siegel The research of Michael Siegel is focused on the analysis and numerical computation of moving boundary problems that arise in fluid mechanics, materials science, and physiology. His research in fluid dynamics covers singularity formation on interfaces for inviscid and low Reynolds number (Stokes) flow, the dynamics of drops and bubbles (including the influence of surfactant), and effect of small regularization--such as surface tension--on mathematically ill-posed interfacial flow problems. His studies in materials science primarily involve crystal growth and diffusion controlled moving boundary problems. In physiology, he has studied optimal suturing patterns for skin wounds and formulated models for determining the stress and strain distribution in the heart wall that occur due to changes in heart geometry. David Stickler The research of David Stickler has centered on the application of asymptotic and numerical methods to study some basic problems in wave propagation and diffusion. The wave propagation problems have application in electromagnetics, acoustics, and elasticity. They include some problems in inverse scattering. The diffusion problems include work in thermal conduction and thermo-elastic diffusion. In this work, both uniform and non-uniform asymptotic methods have been developed. His current research focuses on the equilibrium configuration of elastic membranes with the emphasis on cylindrically symmetric annular rings. John Tavantzis The research of John Tavantzis is in the field of operations research applied to problems of parking allocations. Given several parking lots with certain capacities, how does one assign parking so as to minimize total cost to individuals who need to park during certain time intervals. Discrete and

probabilistic models are considered.

Associate Professor

John Bechtold
Dr. Bechtold received the NJIT Excellence in Teaching Award and the CSLA Outstanding Service to Undergraduate Education Award in 2004-05. Also, he received the Albert Dorman Honors College Outstanding Teaching award. The research of John K. Bechtold has focused on the modeling and analysis of physical problems, primarily in the area of theoretical combustion. His studies cover a wide range of topics in both premixed and non-premixed combustion, including stability, ignition, extinction, and complex flame/flow interactions. His current projects include the development of new generalized models of near-stoichiometric flames, stability of expanding and converging flames, and radiation-driven flows in microgravity.

Michael Booty
Michael Booty's principal research interests are in mathematical modeling and asymptotic analysis, and most of the applications he has considered are in the area of fluid mechanics and combustion. His main studies in combustion have focused on the time-dependent and multidimensional dynamics of propagating reaction waves in gas mixtures, solid phase mixtures, and porous media, analyzed by a combination of multiple scale, stability, and bifurcation techniques. His other studies have included prototype reaction-diffusion models, the dynamics of fast reaction waves, and time-dependent effects in droplet burning. He has also collaborated (with members of the Department of Chemistry and Environmental Science at NJIT) on experimental studies for conditions that minimize pollutant formation in the thermal oxidation of common materials. His current research interests include: time-dependent effects in droplet burning, collaborative studies on bubbles with surfactant (with Michael Siegel), localized thermal waves in microwave heating and processing of materials (with Gregory A. Kriegsmann), and studies of the interaction of flexible membranes, or sails, in two-dimensional potential flow (with Jean-Marc Vanden-Broeck, of the University of East Anglia).

Bruce Bukiet
Bruce Bukiet's research concerns mathematical modeling of physical phenomena. He has studied the dynamics of detonation waves, including curved detonations and detonation models of discrete mixtures. He currently uses his expertise in this area to study issues related to homeland security. Prof. Bukiet also researches biological systems and has done work modeling stresses in the heart, blood flow in arteries, and air flow in the lungs, and currently works in the area of postural stability. The goal of this work is in diagnosis of balance problems and evaluation of treatment options. Finally, he works on understanding and optimizing aspects of baseball from a mathematical modeling perspective.

Sunil K. Dhar
The research focus of Sunil Dhar has been on model building and inference. His ongoing research involves proving existence, computing and developing robust and efficient minimum distance estimators such as L2-distance type, under the

following models: linear, AR [k], the additive effects outliers, and the two-sample location model. He also developed functional least squares estimators under the additive effects outliers model. An optimization technique for the general class of sums of absolute multivariate linear functionals has been developed by him. He extended the negative multinomial distribution; this new model has many applications. His ongoing research in multivariate lifetime reliability models involve deriving new multivariate geometric and generalized discrete analogs of Freund's models, with demonstrated applications. Other discrete models developed by him are in the area of models of order k. He has acquired statistical consulting experience.

Rose Dios
In 1990-91 Dr. Dios received the Hispanic Engineer of the Year Award given by the Northeastern Region of the Society for Hispanic Professional Engineers Institute. She also was the recipient of the Outstanding Women Scientist Award given by the NY Metropolitan Chapter of the Association for Women in Science. The research of Rose Dios has focused upon statistical design of experiments with particular emphasis on the study of the existence of balanced fractional factorial designs arising from orthogonal and balanced arrays. She also has applied statistical modelling techniques to research problems in remote sensing, environmental engineering, and clinical medicine, including cardiac risk analysis and recurrence of cancer.

Jorge Golowasch
The research of Jorge Golowasch focuses mainly on the cellular and network mechanisms of long-term regulation of electrical activity in a simple model neural network, the pyloric network of the stomatogastric ganglion of crustaceans. An undesirable consequence of plasticity is the potential instability of the system. In the nervous system, the activity of neurons and neural networks remains quite stable over very long periods of time. Conductances, however, also express plasticity. How this plasticity contributes to stability, however, is a question largely unexplored. Using both electrophysiological and computational tools, he and his students in the laboratory study mechanisms of neuronal plasticity and homeostasis of the ionic currents that determine the excitability and electric activity of neurons and simple neural networks. He is also interested in how neurons interact to form rhythmic pattern generating networks.

Lou Kondic
Dr. Kondic received a 2005-06 Fulbright Scholar grant to study a dimension of thin film science focusing on the thinnest fluids in Argentina.
The research of Lou Kondic has concentrated on modeling and numerical simulations of two groups of physical systems: a) two fluid flows with emphasis on the interfacial dynamics, as well as free surface flows, and b) dynamics of granular systems. His studies of supersonic dynamics of gas bubbles in liquids exposed to acoustic radiation involved analytical and computational modeling of the convective and radiative energy transfer between fluids, and were applied predominantly to the effect of single bubble sonoluminescence. His research in the field of granular materials consisted of developing analytical models, as well as molecular dynamics simulations of 2D and 3D granular systems, with emphasis on the collective effects. His work on the dynamics of thin liquid

	films involved performing large-scale computational simulations with the goal of understanding contact line instabilities and resulting pattern formation. Currently, he is involved in modeling and simulations of granular materials in a microgravity environment, and in the development of numerical methods for highly nonlinear partial differential equations related to the flows of thin liquid films. Zoi-Heleni Michalopoulou Dr. Michalopoulou received a Young Investigators Award, and she is a Fellow of the American Acoustical Society. The research of Zoi-Heleni Michalopoulou focuses on inverse problems in underwater acoustics. Currently, new global optimization approaches based on the tabu methodology are being developed for matched-field source localization and geoacoustic inversion. Also, arrival time and amplitude estimation in uncertain environments is pursued via a novel Gibbs sampling scheme. Farzan Nadim Director of the Biology Program. Farzan Nadim studies rhythmic motor activity generated in the central nervous system by combining experiments and computational techniques. Nadim has a joint appointment with the Federated Department of Biological Sciences and runs a laboratory that conducts experiments on isolated nervous systems of crustacea. These experiments involve elecrophysiological recordings from multiple nerves and neurons, pharmacological manipulations of the system, and immunohistology. The neuronal circuits studied all produce oscillatory output of various frequencies. The lab also models these systems both at the detailed biophysical level and using analytic mathematical techniques. His current focus is on contribution of synaptic dynamics to network output and the interaction between multiple oscillatory systems. Peter G. Petropoulos The research of Peter G. Petropoulos has focused on the numerical modeling and asymptotic analysis of physical problems in the areas of transient electromagnetic wave propagation in complex media. His studies of pulsed electromagnetic waves in dispersive media mainly concern the asymptotic and numerical methods for studying the response of relaxing (Debye) and fractionally-relaxing (Cole-Cole) dielectrics, as well as the development fourth-order accurate finite difference methods for the time-domain Maxwell equations with discontinuous coefficients. His current projects include analysis of the error in problems where impedance boundary conditions are employed, development of numerical techniques to simulate pulse propagation in Cole-Cole dielectrics, analysis of perfectly matched absorbing boundary conditions in relation to exact absorbing boundary conditions, and the development of fourth-order accurate schemes in the presence of curved boundaries. Sheldon Wang The research of Sheldon Wang focuses on combining computational fluid and solid mechanics with various modeling of physical and chemical phenomena at different temporal and spatial scales. A current generic model problem of interest to him involves a deformable cell immersed in viscous fluid environment. The evolution of such a fluid-solid system can be triggered by

chemical kinetics, thermal fluctuation, reaction, diffusion, or even convection due to environment alternation, osmotic pressure gradient, and solid deformation. The understanding of this model system will shed light on behaviors of cells and biosystems.

Assistant Professor

Christopher E. Elmer
The research of Christopher E. Elmer has focused on developing analytical and numerical solution methods for functional differential equations of mixed type and their application to phase transitions in solids. His studies of spatially discrete reaction-diffusion equations include functional analysis and iterative numerical techniques to demonstrate the solution properties of propagation failure, lattice anisotropy, and step-like interfaces. His studies of solution techniques for general differential-difference equations has led to his development of a relaxation variant of Newton's method and the creation of a collocation code. His current projects include developing a public domain collocation code for solving differential-difference equations, analyzing error due to applying differencing methods to reaction-diffusion equations, analyzing multiple interface solutions to spatially discrete reaction-diffusion equations, analyzing the solutions of the spatially discrete sine-Gordon equation, developing an orthogonal spline collocation tool for studying diffusion induced grain boundary motion in thin films, and modeling crystalline material growth with energy equations which contain a spatially discrete gradient.

Daniel Goldman
The research of Daniel Goldman has focused on the analysis and simulation of nonlinear partial differential equations, the development of numerical methods for PDEs, and the modeling of complex physiological processes. His work on the Ginzburg-Landau equation has involved the characterization of chaotic behavior in one and two spatial dimensions using tools from both turbulence and dynamical systems. His work in numerical analysis has covered operator splitting schemes for dissipative systems and efficient methods for solving reaction-convection-diffusion problems in complex geometries. His work in theoretical and computational biology has studied affinity maturation in the immune system and the relationship between capillary network structure and tissue oxygen delivery. His current projects include improvement of numerical methods for studying time-dependent microvascular transport, investigation of the factors that determine the hemodynamic properties of capillary networks, and modeling of various pathophysiological processes that occur in the microcirculation.

Roy Goodman
Roy Goodman's research focuses, broadly, on nonlinear wave phenomena. The tools he uses consist mainly of asymptotic methods, dynamical systems analysis, and numerical simulation. Physical applications he has studied include storm propagation in the atmosphere at middle latitudes and the interaction of light pulses in telecommunications optical fibers. Recently, he has been investigating the interaction of nonlinear waves with localized changes to the media through which they propagate. This includes the enticing possibility of "light trapping" at specified locations in optical fibers, as well as more abstract

studies of classical nonlinear wave equations.

David J. Horntrop
The research of David J. Horntrop has focused on the development and numerical simulation of stochastic models of physical phenomena for problems ranging from materials science to fluid dynamics. His studies of turbulent diffusion were based on random field models for the advection of passive scalars and involved asymptotics, stochastic analysis, and the creation of novel wavelet-based Monte Carlo numerical schemes for the simulation of random fields. His current studies of materials involve the development and use of mesoscopic models to describe surface processes in order to gain insight on the importance of small scale phenomena on the creation of large scale patterns. He is presently developing and validating new spectral methods for the numerical solution of stochastic partial differential equations for these studies.

Shidong Jiang
The research of Shidong Jiang has mainly focused on fast numerical algorithms for PDEs and their applications to large scale problems in physics, chemistry and engineering. He has developed a fast and accurate numerical algorithm for the nonreflecting boundary conditions for the Schrodinger equation. He also developed a stable second integral equation formulation for scattering by open surfaces in two dimensions. When the SKIE formulation is combined with a Fast Multipole Method and iterative solver, a fast and stable numerical algorithm has been developed for large scale open surface problems arising in biology and antenna and radar design. Recently, he has derived analytical solutions for the hyperpolarizabilities for the one dimensional infinite single electron periodic systems which showed that the overall symmetry in nonlinear optics is actually broken.

Victor Matveev
The research of Victor Matveev is in the area of computational neuroscience, and is focused primarily on biophysical modeling and numerical simulations of synaptic function and its mechanisms. In his work, Victor Matveev employs analytical methods as well as a variety of computational techniques, from stochastic modeling to numerical solution of partial and ordinary differential equations. Victor Matveev performs most of his work in collaboration with experimental neurophysiologists, and develops models to explain and fit the experimental data. His current projects include the study of the mechanisms of short-term synaptic facilitation and other calcium-dependent processes involved in neurotransmitter secretion, and the modeling of presynaptic calcium diffusion and buffering. To facilitate his research, Victor Matveev also has been working on the development of a software application designed for solving the reaction-diffusion equation arising in the study of intracellular calcium dynamics ("Calcium Calculator").

Richard O. Moore
Richard Moore's research focuses on wave phenomena in optical communication systems and optical devices. He is particularly interested in how such systems and devices are disturbed by a variety of influences relevant to their operating environments. Current projects include using a combination of perturbation methods and importance sampling to simulate rare events in

optical communication lines, and using dynamical systems techniques and rigorous reduction methods to analyze the impact of heating due to optical field absorption in devices that convert optical frequencies using parametric gain media.

Cyrill B. Muratov
The main research direction of Cyrill B. Muratov is pattern formation, self-organization, and non-linear dynamics in systems described by coupled reaction-diffusion equations, with primary applications to biological systems and materials science. He uses dynamical systems theory, singular perturbation techiniques, matched asymptotics, non-local eigenvalue problems, as well as exact analytic, variational, and numerical methods, to study traveling wave solutions, interfacial patterns, and more complicated spatiotemporal patterns. Current ongoing projects with biological applications include analytical studies of excitability, pulse propagation, and spiral waves in excitable biological cells, and modeling and computational analysis of autocrine loops in cell signaling networks. His research in materials science involve studies of the kinetics of domain pattern formation in systems with long-range interactions and polymer-liquid crystal systems, as well as formation of hot spots in ceramic and other materials.

Christopher Raymond
The research of Christopher S. Raymond has focused on mathematical modeling and the development of asymptotic, perturbative, and numerical techniques for studying reaction-diffusion systems in which the reactions are confined to the vicinity of either propagating interfaces (applications to combustion, material synthesis, and frontal polymerization) or to portions of the boundary of the domain of interest (biological applications). He is currently concentrating on developing and analyzing mathematical models for immunocolloid labeling, a novel technique for imaging molecular scale features on cell surfaces using electron microscopy.

Gareth Russell
The research of Gareth Russell is in the field of applied spatio-temporal population dynamics, community dynamics incorporating evolution, statistical methods for conservation, automated field censusing, and the ecology and management of non-natural ecosystems.

Louis Tao
The research of Louis Tao focuses on large-scale scientific computation, through a combination of numerical simulations, bifurcation theory, and asymptotics. He is mainly interested in the modeling and analysis of the dynamics of networks, with applications to specific problems in neuroscience and mathematical biology. His work in computational neuroscience has been in two distinct areas: a) how neurons in the visual cortex process elementary features of the visual scene and b) how recurrent networks perform computations. His current projects include the modeling of orientation selectivity in cortex and the analysis of the network dynamics that arises.

Yuan-Nan Young
The research of Yuan-Nan Young focuses on the multiphase flows in

	computational fluid dynamics (CFD), and relevant issues in numerical treatment of moving boundary problems. In particular he has numerically investigated how surfactants, both soluble and insoluble, can affect the pinch-off of bubbles in viscous fluids. He also investigates numerical schemes to optimize the accuracy of regularization of surface tension force in CFD codes. His current projects also include an investigation on the hysteretic behavior of drop deformation in highly viscous straining flows.
Physics	<u>Distinguished Professor</u> Phil Goode Observational and theoretical solar physics. He leads a team building the world's most capable solar telescope. Additionally, he is involved in climate research. Roland Levy Synthesis and characterization of CVD and sputtered thin films; Design and fabrication of integrated sensors for detection of hazardous species. Haimin Wang Solar physics and phenomena of the atmosphere of the Sun including solar flares, sunspots, active regions, filaments and prominences, quiet Sun network. Additionally, he does work in solar instrumentation. <u>Full Professor</u> Leon Buteau Chairperson, Materials Science and Engineering Ken Chin Fiber optical sensors and systems for utility modernization and home land security; MEMS sensors and systems for utility modernization and home land security. John F. Federici Terahertz (far-infrared, sub-millimeter) sources, detectors, imaging, and spectroscopy, Detection of concealed explosives, biological and chemical weapons. Dale Gary Radio Solar Physics; Instrumentation and Microwave Imaging Observations. Gordon Thomas MEMS sensors and laser retinal imaging for hydrocephalus and brain injuries, Laser spectroscopic measurements of glucose for diabetes. Trevor Tyson, Professor, Structure-transport correlations in transition-

	metal oxide systems: Local structural characterization of CMR materials and high temperature superconductors by synchrotron based x-ray absorption and scattering. N.M. Ravindra Electronic and Optoelectronic Materials and Device Structures; Optical Properties of semiconductors. <u>Assistant Professor</u> Carsten Denker Image reconstruction, adaptive optics, two-dimensional spectroscopy, infrared observations, differential solar rotation. Camelia Prodan Biophysics. Andrei Sirenko Strain relaxation and surface migration at the sidewalls of optoelectronic nanostructures, Far-IR spectroscopy. Tao Zhou Infrared Optics, Infrared Photodetector; Integrated Optical Circuits, Photonic Crystals.

7.2 Research staff

Research staff play an important role in the success of the research endeavor. We list the number of research members in each CSLA department or division in Table 7.2.1. An account listing the individuals and their roles is provided in the Appendix. We note that there is a need to double the number of TAs in Chemistry and Environmental Science to run the laboratory classes in an appropriate manner. There is also a need for the full time secretary and a laboratory technician in Chemistry and Environmental Science.

Table 7.2.1 CSLA research staff

Department or Division	CSLA research staff
Biology	Research Assistants Dr. Li Ni (Jonakait) Dr. Cristina Soto-Trevino (Golowasch and Nadim) Post-doctoral Fellow Pascale Rabbah (Nadim) There are currently 10 graduate students (9 PhD, 1 Masters) in the Golowasch and Nadim labs. Mill Jonakait has one Masters student.
Chemistry and Environmental Science	Dr. Gu is involved in chemistry education and her research areas include oxidation and absorption of NOx in oxidizing aqueous or organic media, stoichiometry study on NOx conversion using various analytical techniques, optimization and scale-up of the oxidation and absorption processes. 8 post doctoral fellows hired on grants. Students and teaching Assistants: Currently, the department has a total of 9 TA positions. These TAs support nearly 1100 freshman chemistry students, 400 students in freshman chemistry laboratories, 500 students in a social science GUR and a total of 18 different laboratory sections. Consequently the TAs in the department are often overloaded and there have been several complaints including an article in the Vector. For example, nearly 200 students take the freshman laboratory every semester. That would make up six to lab sections, since the department does not have enough TAs, the students are asked to come in at their convenience for two days in the week. In 1999 before the Chemistry program separated from Chemical Engineering, 14.5 TAs supported the chemistry courses alone. Current requirements including Environmental Policy are estimated at 18-20 TAs.
Physics	Research Professors & Research Interests Enric Palle Bago, BBSO Reginald C. Farrow, Nanoelectronics Anthony Fiory, Silicon Microelectronics George Georgiou, Silicon MEMS John C. Hensel, Solid State Physics Louis J. Lanzerotti, Solar Physics Jeongwoo Lee, Solar High Energy Particles and Radiation Gelu Nita, Solar Radio Bursts Pilar M. Rodriguez, BBSO

	John Varsik, BBSO Vasil Yurchyshyn, BBSO <u>Research/Visiting Scientists & Research Interests</u> Valentyna Abramenko, Study of magnetic structure in the active regions Kyung-Suk Cho, Solar radio burst locator Deqing Ren, Development of an advanced image slicer integral field unit

7.2.1 Students, post-docs

The table below provides a number breakdown regarding students post-docs and teaching assistants.

Table 7.2.2 CSLA Research Staff Members by department/division

Dept or Division	Post Docs	TA	Admin	PhD students	MS students	Tech Assistants	Total
Biology	1			9	1	2	13
Chemistry and Env Science	8	9	2	23	50		92
Math Sciences	2	24	5	31	37		99
Physics	6	17	4	32	3	2	64
Total	17	50	11	95	91	4	

7.2.2 Administrative

Table 7.2.2.1 Administrative personnel

Department or Division	Administrative personnel
Biology	Karen Roach, Academic Coordinator
Chemistry and Environmental Science	Gayle Katz, Assistant to the Chair Michele Collins, Academic Programs Coordinator and Administrator Half-time secretary (hiring is in progress). A full time secretary is needed
Humanities	Janet Bodner, Associate Director, ESL Program John Coakley, Director, Composition and Intensive Studies Winifred Cummings, Secretary William Gile, Associate Producer and Creative Director, Theatre Michael Kerley, Director, TA Instructional Program Jerome Paris, Director, ESL Program Michele Rittenhouse, Assistant Director, Theatre Michael Tress, Administrative Coordinator

Mathematical Sciences	Padma Gulati, Administrative departmental Coordinator Susan Sutton, Assistant to the Chair Sherri brown, Administrative Assistant II Alba Henderson, Secretarial Assistant III Evette Ma, Principal Clerical Assistant
Physics	Renee Crawley, Assistant to the Chair Christine Oertel, Administrative Assistant of CSTR Jennifer Valenti, Customer Relations Representative Leslie Williams, Secretarial Assistant

7.2.3 Technical

Table 7.2.3 Technical personnel

Department or Division	Technical personnel
Chemistry and Environmental Science	A laboratory technician is needed to maintain the laboratories and the numerous instruments the department has
Physics	Bijan Rassekh Herminio Ramirez

8. Research strategic directions [Strategic decisions]

CSLA will engage in a college-wide effort to identify promising new directions that are consistent with the mission of NJIT and make use of the expertise among the departmental faculties. More detail on our status and the directions we will pursue is provided in subsections 8.1-7.

8.1 University strategic areas [Relevance to university plan]

In addition to providing strong academic programs, it is essential for CSLA to achieve national prominence by enhancing its reputation for outstanding, cutting-edge research. This is the essence of our focus on expanding research accomplishments (one of the College's Strategic Plan goal). CSLA has already made major strides in research and scholarship over the last five years. Both the quality and quantity of research publications has improved greatly, and research expenditures have now reached over seven million dollars. These achievements give testimony to CSLA's efforts to enhance and expand research/scholarship quality and productivity.

Achieving an even better reputation, in harmony with NJIT's Strategic Plan, is a process that has already begun, and it will continue to be a work-in-progress over the next five years. The NJIT Strategic Plan has identified the Department of Mathematical Sciences as a unit that will receive the requisite support to build nationally recognized programs upon the considerable strengths they already have. Also, some of the niche entities selected for support, such as materials science and biomedical engineering, are areas in which CSLA has significant expertise and involvement. With other research initiatives in the departments of physics and chemistry/environmental science, such as our internationally recognized solar physics group at Big Bear, and in our emerging biological sciences presence, the College is well situated and on its way to achieving its research goals.

In order to build upon its successful research platform, CSLA must provide a more stimulating and congenial environment for creative activities and an effective infrastructure to support its research initiatives. Improvements in these areas are required to provide the necessary elements for attaining a competitive research presence with the best universities in the country.

Current levels of research and scholarly quality, production and funding are much higher than they were just a few years ago, but an increase of about 60% in each of these categories will be required over the next five years in order to be competitive with top tier technological universities and to be consistent with the university's strategic plan. A number of initiatives will be implemented in order to strengthen research. These include: increasing interdisciplinary activities among both academic units and high technology industries (consistent with the expertise of our faculty), expanding of faculty hiring in targeted areas to insure an influx of new talent that will improve and consolidate the College's research

activities, identifying research areas (such as bioscience, computational science, and materials science) as foci of interdisciplinary research activities and providing the resources necessary to for these efforts to flourish.

The Strategic Areas in which each of CSLA's departments or divisions contributes are presented in Table 8.1.1.

Table 8.1.1 Major research areas in CSLA

Department or Division	Strategic research areas
Biology	Neuroscience; Population Dynamics
Chemistry and Environmental Science	Environmental, Material and Biological Sciences and in Nanotechnology
History	The History Department's research focus on the History of Technology/Communications, Environment and Medicine/Health is the liberal arts dimension of the university's fundamental strategic mission in research: "committed to the pursuit of excellence in the conduct of research with emphasis on applied, interdisciplinary efforts" in the various areas of engineering and technology, communications, and sciences, including health sciences.
Humanities	The Humanities Department's research areas are quite diverse, consisting of scholarship into writing and program assessment; ESL education reform; music, nature and technology; philosophy of science and aesthetic expression; 20th-century European history; poetics; textual analysis; medieval history and literature; the history of warfare; technology transfer; the history of technical communication; new media; and ethics and technology.
Mathematical Sciences	The institute has tagged itself "New Jersey's Science and Technology Institute". Both science and technology rest on the foundation of mathematics. The institute has designated mathematics as one of the main areas of growth under its strategic initiative. Within the field of mathematics, the subfields of Mathematical Fluid Dynamics and Mathematical Biology have been identified as those which have the greatest potential impact on other NJIT departments and on the community as a whole. DMS also houses the Division of Biological Sciences. The Bio and Life Sciences are gaining increasing prominence in the 21st century and departments within CSLA are well positioned to contribute to their study.
Physics	In addition to providing strong academic programs, it is essential for the Department of Physics to expand its current national prominence from a few selected areas to a broader array by enhancing its reputation for outstanding, cutting-edge research. This is the essence of our focus on expanding research accomplishments. The Department of Physics has achieved national and international prominence in the area of Solar and Terrestrial Physics. Other areas that have achieved some national prominence are optical science and photonics (particularly submillimeter or terahertz imaging and spectroscopy), as well as condensed matter physics and material science. NJIT's physics department excels in the area of materials characterization. Specifically, we are

	developing new and novel synchrotron based instrumentation and methods for probing electronic and atomic properties of materials using energies ranging from the IR to the hard x-ray region. The department has already made major strides in research and scholarship over the last five years. The Physics Department is particularly proud of its junior faculty hires. Since 1997, the junior faculty have been awarded 6 NSF Career awards. In 2005, the total Direct and Indirect research expenses for all of NJIT was $43M Total. Within the Five Academic Colleges, which includes ~320 Tenured/Tenure-track Faculty, the total research expenses in 2005 were about $ 22.5M. The expenses over the same period for the department of physics (13 Tenured/ 4 Tenure-track Faculty) was $5.86M. The Department of Physics itself accounts for roughly 26% of all research expenditures in the five Academic Colleges. The tenured/ tenure-track faculty may be broken down into the following research groups; Optics/ Photonics Group (4), Solar-Terrestrial Research Group (5), Biophysics Group (2), Condensed Matter/ Materials Science (4), with some significant overlap between the groups. For example, several members of the optics/ photonics group interact strongly with the condensed matter/ material science group. Some of the niche entities selected for support, such as materials science and biomedical engineering, are areas in which the Department of Physics has significant expertise and involvement. Professors Thomas, Prodan, and Federici are pursuing interdisciplinary biomedical/ biophotonic research with the Biomedical Engineering Department as well as UMDNJ. Several of the Optical Science and Engineering courses (OPSE 301, 310, and 410) that are offered through the Optics/ Photonics group attract significant numbers of biomedical engineering and biology students. In the area of Materials Science, the Department of Physics plays a leading and leadership role. New courses in the nano-bio materials, nano-fabrication, and mathematical and statistical methods are being developed to enhance NJIT's materials science program. In addition, the materials program is being expanded to take advantage of NJIT's base materials capabilities. The Graduate Program Director of the Materials Science program is Prof. Tyson.

8.2 College/School strategic directions [Research focus]

CSLA faculty research strengths areas are listed above in Table 8.1.1. While we will continue to promote research in these areas of our expertise, we note that we have been moving more effort and resources in the interdisciplinary areas related to biology. These areas: computational neuroscience, mathematical biology, biochemistry and biophysics will be targeted for further investment and growth. With our efforts geared toward building research groups that can achieve national prominence in the areas listed in Table 8.1.1 and not diffusing our efforts to try to do research in all sub-disciplines, we feel we will be better positioned to enhance NJIT's national stature.

Other Research Strategies and Goals are:

- Promote collaborations that promise funding/recognition (CSLA, NJIT, Rutgers-Newark, UMDNJ).
- Encourage funding that supports undergraduate/graduate education.
- Increase research funding, externally supported graduate students, and postdocs (60% over 5 years).

8.2.1 Disciplinary

Table 8.2.1 Disciplinary research areas in CSLA

Department or Division	Disciplinary research areas
Biology	The NJIT biology faculty research interests incorporate three distinct areas of biology: Neuroscience, Developmental Neurobiology/Neuroimmunology and Complex Ecological Systems.
Chemistry and Environmental Science	The department is represented in all areas of chemistry, and limited focus areas within environmental science including environmental policy.
History	The NJIT History faculty have plans for continued research activity in the History of Technology/Communications, Environment, and Medicine/Health. Neil Maher is writing a book on the environmental history of NASA, for which he spent the 2004-5 academic year at the Smithsonian Institution's National Air and Space Museum as the Verville Fellow. As mentioned above, Stephen Pemberton's next book, on the history of hemophilia, is already under contract with Johns Hopkins University Press and is scheduled for publication in 2007. Richard Sher is preparing a volume of his collected essays in the history of communications, and he is also editing a volume of James Boswell's correspondence that will be published by Yale University Press. John O'Connor is co-editing a new volume on film and history with Peter C. Rollins of Oklahoma State University. Through its emphasis on the History of Technology/Communications, Environment, and Medicine/Health, History is emerging as the scholarly flagship of the liberal arts at NJIT, and it is a high priority of CSLA to continue building it into a field of national stature. Although a number of other technological universities in America emphasize the history of science, medicine, and related areas, only NJIT (and at the doctoral level, Rutgers-New Brunswick, taking its lead from NJIT) has defined the field in a manner that links the history technology, communications, environment, medicine, and health. These connections are crucial in today's world, in which technological developments often have huge implications and consequences for the environment and for human health.
Humanities	Members of the Humanities Department continue to conduct joint research and scholarship in the areas of program and writing assessment (five members presented at CCCC, the premier conference for English educators) and

	humanities eLearning pedagogy and policy, while also pursuing individual research agendas in philosophy, aesthetics, literature, American studies, technology transfer, visual communication, history and philosophy pertaining to technology and social issues.
Mathematical Sciences	Aside from research strengths in Mathematical Fluid Dynamics and Mathematical Biology, DMS also has strong research groups in Wave Propagation, which includes non-linear optics, Applied Analysis and in Statistics. These areas of strength allow DMS to pursue research in a wide number of areas within applied mathematics and statistics.
Physics	In order to build upon its successful research platform, CSLA must provide a more stimulating and congenial environment for creative activities and an effective infrastructure to support its research initiatives. Improvements in these areas are required to provide the necessary elements for attaining a competitive research presence with the best universities in the country. A number of initiatives will be implemented in order to strengthen research. These include: increasing interdisciplinary activities among both academic units and high technology industries (consistent with the expertise of our faculty), expanding of faculty hiring in targeted areas to insure an influx of new talent that will improve and consolidate the College's research activities, identifying research areas (such as bioscience, computational science, and materials science) as foci of interdisciplinary research activities and providing the resources necessary to for these efforts to flourish. Strategies for success include: • Promote collaborations that promise funding/recognition (CSLA, NJIT, Rutgers-Newark, UMDNJ). • Encourage funding that supports undergraduate/graduate education. • Increase research funding, externally supported graduate students, and postdocs (60% over 5 years). **Solar-Terrestrial** - The breadth of the research in this area has recently increased with the addition of a new faculty member in terrestrial upper-atmospheric research. Both existing solar observatories, Big Bear Solar Observatory (BBSO) and Owens Valley Solar Array (OVSA) are involved in significant instrument/infrastructure upgrades. There are three specific areas in which needs can be identified: (i) In the short term, a theorist in solar MHD and/or plasma physics is needed to fulfill both educational and research needs. (ii) In the intermediate term (2-3 years), an additional faculty member in solar instrumentation is needed; it will be either a radio physics position that is needed to place NJIT in a position to fully participate in the development of the Frequency Agile Solar Radio telescope facility, or an optical solar physics position to develop instruments for the 1.6m new solar telescope at BBSO. (iii) In the longer term (3-5 years), an additional faculty member in the area of upper-atmosphere/space weather research is needed. **Biophysics** - A major strategic direction of the physics department is to develop biophysics research and teaching through the hiring of new faculty. This

program is in its infancy, although Gordon Thomas is developing an interdisciplinary medical physics program in diabetes, glaucoma and hydrocephalus with several patents pending. We have just hired Camelia Prodan who is working on cellular systems with applications to cancer. We have just formulated a biophysics concentration and will be able to staff it when we have more faculty. We propose to form a cohesive group that can collaborate on research, grants, teaching and interdisciplinary activities:

- In the short term, we would like to hire a versatile theoretician who could work both on medical and cellular biophysics applications and improve our biophysics undergraduate concentration.
- In the next year we would like to expand our cellular biophysics faculty with an emphasis on cancer and heart disease.
- In the intermediate term, we propose the addition of a medical physicist with interests in new optical and electronic devices.
- When possible, we would like to add a nano-biological physicist who would study proteins and DNA.
- When possible, (3-5 years) we propose the addition of a stem cell biophysicist.

Optical Science/ Photonics - **Optical Science/ Photonics** –Currently, there are four faculty members whose primary research emphasis is photonics and optical characterization of materials. (Prof. Thomas is counted in both the Optics group and the Biophysics group). This group strongly collaborates with both the Biophysics group as well as the condensed matter physics group. Due to the strong interaction among the different research groups, the department does not have enough faculty in each of the four major research groups to cover the core and specialty courses in physics at either the undergraduate or graduate level. To expand the research specialties of the Optical Science/ photonics group, and to further collaboration within physics and interdisciplinary research with other departments, we would like to establish strategic research in the area of imaging science and non-linear spectroscopy.

Imaging science has become an enabling technology to a wide variety of fields including medical imaging, solar physics, non-destructive evaluation/ security screening, and biology. One of the fundamental issues is developing imaging capabilities in any spectral range is the availability of compact, efficient, tunable and bright radiation sources. Sensitive, compact imaging arrays are of commensurate importance for imaging systems and imaging science. The development of imaging science and photonic detectors/sources as research thrusts will further strengthen the optics/ photonics group as well as link a variety of academic departments through interdisciplinary research.

Nonlinear spectroscopy is another area that is of great interest to the optics group. It is a subject that has exhibited spectacular growth in the past decade, much of it promoted by increasingly affordable and reliable pulsed laser instrumentation. Applications are to be found in an impressively diverse range of sciences and technologies, extending from bio-imaging, telecommunication, to characterization of strongly correlated materials. In these and many other areas of study a considerable range of nonlinear spectroscopic techniques is

	now brought into play, including coherence spectroscopy, nonlinear Raman scattering, multiphoton absorption, harmonic and sum-frequency generation, and hyper-Rayleigh scattering. The diagnostic applications of nonlinear spectroscopy on condensed matter and biological systems will facilitate the cooperation with current optics faculty, and make the optics group at NJIT more complete and productive. **Condensed Matter Physics** - In the areas of condensed matter physics, the focus is on Structure-transport correlations in transition-metal oxide systems: Investigation of the origin of magnetic properties of thin films; Fundamental Atomic and Molecular Physics; Relativistic and correlation effects in atomic and molecular system and correlations between surface morphology and optical properties of semiconductors. The development of new and novel materials for applications to magnetic storage, optical devices and semiconductor technology, for example, requires a deep understanding of the fundamental physics underlying the properties of these materials. One of NJIT's strengths is in the characterization of materials utilizing both on-campus facilities and national laboratory resources such as synchrotron radiation sources. An important area in which NJIT is lacking is in the development of computation methods to predict new materials properties or to show the effect of scale or size on particle properties (bulk to nano-scale). In addition, we suffer from a lack of thin film synthesis capability in this area. Three members of the department are working in the area of strongly correlated systems. This is an area which is rapidly evolving and show promise to develop new classes of materials which can be used as sensors and for data storage. We have considered forming a center but quickly realized that without theoretical support, at a minimum, our proposals for group funding would be non-competitive. With the addition of a synthesis capability NJIT could rise to the top of this new and evolving field by having all components, synthesis, analysis and prediction capabilities. For the long-term, we prose hiring two theorists – one in computation condensed matter physics and one in analytical methods to form a theory subgroup. In addition, we propose hiring an expert in thin film deposition (See also materials section). Hiring in these areas will have an impact not only on our department but on the capabilities of other fields at NJIT including chemistry, chemical engineering, materials science, optics and others.

8.2.2 Interdisciplinary

CSLA encourages interdisciplinary research and is aggressively promoting research interactions among faculty members from diverse departments. One area of intense focus is the interconnections between biology and other areas – Mathematical Biology, Biophysics, Biochemistry, and Biostatistics.

Table 8.2.2 Interdisciplinary research areas in CSLA

Department or Division	Interdisciplinary research areas
Biology	The Division of Biological Sciences researchers use interdisciplinary approaches towards understanding biological problems by incorporating mathematical and computational techniques. All faculty members have a record of journal publication within their discipline as well as in interdisciplinary journals.
Chemistry and Environmental Science	The department participates in interdisciplinary programs that includes collaboration with Environmental Engineering, Material Science and in Nanotechnology.
History	By exploring the history of all the scientific and technological fields that the college emphasizes in its research, the research program of the History faculty at NJIT connects with all the other programs in CSLA. It has particularly strong ties with the Science, Technology and Society (STS) program, the Environmental Policy M.S. program, and with Communication program.
Humanities	Although most faculty in the humanities are focused on disciplinary scholarship, a few members of the Humanities Department are engaged in interdisciplinary research areas, including statistical applications to program and writing assessment; history and the iron industry in the United States; philosophy of science and literary expression in the United States; information technologies and pedagogy; and computing and composition practices.
Mathematical Sciences	Mathematics and Biology are quite well integrated from the research angle. There are several undergraduate and graduate mathematical biology courses. Several DMS faculty are working on interdisciplinary research in neurobiology, developmental biology and even genomics. DMS faculty also interact with faculty from Mechanical Engineering, Chemistry and Physics on problems of common interest.
Physics	The Physics department has an interdisciplinary medical physics program in diabetes, glaucoma and hydrocephalus. Work in the area of Materials Science – flexible macroelectronics with particular emphasis on flexible sensors – can be expanded to biomedical and robotic applications. In addition to the impact of the Condensed Matter Physics group on Material Science, the Physics Department over the past 6 years, has gained considerable expertise in flexible macroelectronics with particular emphasis on flexible sensors. The flexible sensors, which are typically fabricated on a plastic substrate, have been adapted to various applications including Picatinny Arsenal's Smart/ Active Coatings programs, robust acoustic sensors, and measurement of brain fluid flow. This research will be expended to include more biomedical as well as remote robotic sensory applications.

8.3 Participation in research centers

8.3.1 Existing centers

Research centers provide a structure through which faculty from different departments with expertise in diverse areas are able to combine their knowledge and efforts to produce new ideas. NJIT has a number of research centers and CSLA faculty members participate actively in many of them.

Table 8.3.1 Existing Research Centers

Department or Division	Existing Research Areas
Biology	None within the Division of Biological Sciences, Biology faculty are members of the Center for Applied Mathematics and Statistics, housed in the Department of Mathematical Sciences at NJIT and the Integrative Neuroscience Center ran by Rutgers-Newark and UMDNJ.
Chemistry and Environmental Science	Environmental Research Centers are located in the York building.
Mathematical Sciences	*The Center for Applied Mathematics and Statistics* is housed within DMS. This center not only has various DMS faculty as its members, but also faculty from other departments such as Civil Engineering, Mechanical Engineering, and Computer Science, faculty from other institutions such as University of Michigan, Delaware State University, faculty from other countries such as Belgium, England and Italy and industrial members from Novartis.
Physics	*Center for Solar-Terrestrial Research*—Housed fully within the Physics Department, CSTR operates two world-class solar observatories, doing basic solar research and providing data and support for NASA spacecraft missions and external, NSF-funded researchers. The research of the center also includes studies of the Earth's atmosphere and space environment, as well as instrument development and image processing algorithms and techniques. *Microelectronics Center* – The Physics Department has several externally funded research projects which use the Microelectronics Center and its clean-room facilities. These projects include the Smart/ Active coatings program and Microelectro-mechanical (MEMS) projects sponsored by DARPA. *Homeland Security Technology Systems Center at NJIT* – The Physics Department participates in HSTSC thorugh various homeland security related sensory technologies, including stand-off detection/ imaging of concealed weapons and explosives. *Electronic Imaging Center* – In collaboration with the ECE department, the department works with the EIC in developing new imaging

	modalities and sensory technologies.

8.3.2 Plans for new centers/institutes

Table 8.3.2 Plans for new research centers

Department or Division	Plan for new research centers
Physics	*Center for Strongly Correlated Materials* – As discussed in the Condensed Matter Physics Group section, three members of the department are working in the area of strongly correlated systems. This is an area which is rapidly evolving and show promise to develop new classes of materials which can be used as sensors and for data storage. With the addition of an Assistant Professor theorist for which the department is currently (as of February 2006) conducting a search, a Center will be formed. With the addition of a synthesis capability NJIT could rise to the top of this new and evolving field by having all components, synthesis, analysis and prediction capabilities. *Infrastructure Security Research Center* - In collaboration with New Jersey's utility company PSE&G and the national Electrical Power Research Institute (EPRI), as well as New Jersey based firms Physical Acoustic Corporation (PAC), Advanced Chips and Products Corporation (ACPC), and CFT (CF Technologies, Inc.), we are launching an Infrastructure Security Research Center. Current funding is supplied by PSE&G with $400,000 per year. Further funding is being pursued at DOE, DOD, and NJ Commission for Science and Technology. The goal is to reach $1~2 million per year. Senior team members include Ken Chin, George Georgiou (Research Professor, Physics), Guanhua Feng (Associate Research Professor, Physics), and Edip Niver (ECE). One postdoc, about 5 Ph.D. students, and a few M.S. and B. S. students will participate in the Center's research. The research projects are: Gaussian beam interferometric device (GBID) for on-line transformer partial discharge (PD) acoustic monitoring, chemical sensor for on-line transformer partial discharge monitoring, on-line underground cable motion and PD monitoring, and on-line GPS wireless monitoring of transmission line splice.

8.4 Participation with industry [Outline activities]

NJIT's centers are most actively responsible for the industry collaborations of our faculty.

8.4.1 Through EDCs/incubation activities

Table 8.4.1 Participation with industry

Department or Division	Participation with industry
Chemistry and Environmental Science	*Exxon* –Provides support to department faculty in research, and to develop a biochemistry laboratory.

Mathematical Sciences	*Bell Labs* - DMS faculty Richard Moore has obtained a grant from the NSF to hire an industrial post-doc which is partly funded by Bell Labs. Research in non-linear optics will be the main emphasis of this post-doc. There is industrial participation through the statistics consulting lab.
Physics	*PSE&G* – See proposed new center above: *Infrastructure Security Research Center* *Picometrix* – This company is the premiere manufacturer of time-domain Terahertz spectroscopy and imaging systems. NJIT has several joint contracts with Picometrix to develop Terahertz spectroscopy and imaging system for stand-off detection of explosives, bio/chemical weapons. As products are developed, Picometrix will license NJIT's Terahertz intellectual property. *Edmund Optics* – has been a long time supporter of the physics department including its optical science educational programs. Edmund Optics currently donates ~$3000 in supplies and equipment annually to NJIT and sponsors $5000 annually in scholarships for Applied Physics Majors. *Lucent Technologies* – Currently the group of Prof. Tao Zhou has close collaboration with the Crawford Hill Lab of Bell Labs, Lucent at Holmdel, New Jersey. The collaboration is focused on the fabrication of photonic crystal and negative refractive index material in the mid infrared range. Crawford Hill Lab has a superb clean room facility for III-V semiconductor, as well as MOCVD setup for III-V quantum well wafer growth, which we are taking full advantage to fabricate novel photonic crystal structure on AlGaAs-GaAs quantum well wafers. These novel device have the potential to greatly enhance the bandwidth of free space communication, as well as making the first negative index material in the mid infrared region. This project involves NJIT graduate student performing Ph.D. thesis research at the facilities of Crawford Hill Lab. In addition, a collaborative research program (including NJIT graduate students performing PhD research at Lucent Technologies) to develop secure, wireless communications links has just been initiated.

8.4.2 Through centers

In the table below, we list department connections with industry facilitated through NJIT's research centers.

Table 8.4.2 CSLA – Industry Research through EDCs

Company	Department	Comments
PSE&G	Physics	*Infrastructure Security Research Center* - In collaboration with New Jersey's utility company PSE&G is providing funding toward the *Infrastructure Security Research Center* of $400,000 per year.
Picometrix	Physics	This company is the premiere manufacturer of

		time-domain Terahertz spectroscopy and imaging systems.
Edmund Optics	Physics	This company has been a long time supporter of the physics department including its optical science educational programs.
Lucent Technologies	Physics	Collaboration focused on the fabrication of photonic crystal and negative refractive index material in the mid infrared range and collaborative research program to develop secure, wireless communications links.

8.5 Other research areas

Here we list some other areas of research in CSLA not noted above.

Table 8.5.1 Other CSLA Research

Department	Research area
Chemistry	The department plays leading role in computational techniques and nanotechnology activities at NJIT. We are represented in the NSF Engineering Research Center just funded by NSF and in the Active Coatings Program from the US Army.

8.6 Research equipment investments

Table 8.6.1 Research equipment investments

Department or Division	Equipment investments
Chemistry and Env. Science	NMR, and X-ray diffraction.
Humanities	As part of the laboratory replacement cycle, the CIO has refurbished the Writer's Lab, which now contains 16 pcs, augmented by software procured through grant funds made available from the Dean's office.
Mathematical Sciences	Two major grants have greatly improved the research infrastructure of DMS. The first is a grant from NSF which has allowed DMS to purchase a Beowulf computing cluster. The second is also a grant from NSF which has allowed DMS to update its senior Capstone lab. The updated lab will allow for better and more in depth experiments and modeling projects for our undergraduate students.
Physics	The Physics Department has a large research equipment investment. A brief list of the equipment is given below. Most of this equipment has been purchased either through external research grants/ contracts or

	through new faculty startup packages. The Department has been very successful in acquiring new equipment through funding agencies such as NASA, NSF, DOD, and DARPA. However, research grants and contracts do not generally fund the maintenance of equipment. The maintenance of equipment, by federal contracting regulations, is to be covered by indirect costs. However, since no indirect cost recovery is provided to Principle Investigators in the Physics Department (with the exception of the Center for Solar-Terrestrial Research), the research-active faculty generally have no means to maintain their research equipment. While NJIT's Research Office will sometimes provide small amounts of funds in emergency situations, the expenditure of overhead funds for maintenance is not at a sufficient level to properly maintain equipment. The Department has explored several options (unsuccessfully) to raise funds in support of equipment maintenance including the sale of obsolete or non-functioning equipment to fund the maintenance of needed investments. At this point, equipment maintenance remains an unsolved problem. <u>Research Equipment Investments of the Physics Department</u> • Chemical Vapor Deposition (CVD) and Physical Vapor Deposition (PVD) Device Research Labs • Terahertz Spectroscopy and Imaging Laboratory • Laser spectroscopy laboratories • Big Bear Solar Observatory • Owens Valley Solar Array • Rapid Thermal Processing Laboratory

8.7 Plans for future research

Table 8.7.1 Research equipment investments

Department or Division	Plans for future research
Biology	Biology faculty will continue to carry out high-quality research in the areas of neuroscience and complex ecological systems.
Chemistry and Environmental Science	The department has had a solid track record in research. Future growth areas are biological research, material science and Nanotechnology. The department also would like to revive environmental research that once was the largest program in the university. Currently the department has annual funding to the order of 1.5 - 1.7 million from agencies such as NSF, DOD, US EPA, NIH etc. Faculty members have also received prestigious awards such as the Marie Curie and Full bright Fellowships. Typically the departmental faculty publishes 40-50 peer-reviewed journals, and presents 50-60 papers at conferences. The department's research growth has been hampered by the lack of graduate students. The number of available teaching assistantship slots have been unusually low compared to departments with similar teaching (including

	laboratory instruction) and research outputs. Consequently the number of doctoral students doing active research has dwindled. The department produced 4.25 doctoral students per year over the last five years. However, very few new doctoral students were hired in the last few years, and there is serious concerns that the department may not be able to sustain such as graduation rate, that rate is expected to trickle down to one or two per year. The immediate need for the department is to increase the umber of doctoral students and have more teaching assistantship slots available. The department also needs to hire more faculty members for growth in the biological and environmental sciences. Currently there is only one faculty member with a doctoral degree in Environmental Science that number has to be increased to sustain this program.
History	History of Technology/ Communications, Medicine / Health and Environment Need 1 additional faculty to develop NJIT's national reputation in fields such as (1) technology, environment and medicine / health in non-western regions and (2) history of science (especially life sciences) and (3) history of law in relation to technology, environment, and medicine."
Humanities	To support the growth of new tracks within STS and Communication in music and technology, theatre and technology, and visual culture, the Humanities Department would benefit from five Apple G5 computers and a space for students to work with them, as well as to house existing music production equipment.
Mathematical Sciences	DMS Faculty will continue to carry out high-quality research in the main areas of strength that currently exist within the department. It is envisioned that all research groups within DMS will continue to flourish and will carry out research that it is in line with CSLA and Institute strategic initiatives. For example, faculty from DMS, Chemistry and Physics are currently jointly writing a grant proposal to NSF to increase our abilities to conduct interdisciplinary research in mathematics and chemistry.
Physics	Solar-Terrestrial, Biophysics, Optical Science / Photonics, Condensed Matter Physics. • *Center for Strongly Correlated Materials* • *Infrastructure Security Research Center*

Branching into these new areas will hopefully lead to continued growth in externally supported research funds. Our goal is to increase CSLA research expenditures by 60% over the next 5 years as listed in Table 8.7.2.

Table 8.7.2 CSLA Research Expenditure Goals

Year	Expenditures (in millions of $)
FY 2004	7.2
FY 2005	7.7
FY 2006	8.2
FY 2007	9.0
FY 2008	9.9
FY 2009	10.8
FY 2010	11.8
FY 2011	13.0

9. Space, equipment, services [In conjunction with facilities and IRP]

While biologists, chemists, physicists and engineers, among other scientists need significant amounts of laboratory space, humanities history and mathematical science professors do not need as much space or equipment per faculty member.

Table 9.1 CSLA Laboratory Space

Department	Labs	Comments
Biology	Located at Rutgers-Newark	Each faculty member has a laboratory with an office, located in Boyden Hall at Rutgers: Jorge Golowasch- 314 Mill Jonakait- 339 Farzan Nadim- 344 Gareth Russell- 409
Chemistry	Instrumentation; Organic Chemistry; Freshman; Physical Chemistry; Computational Chemistry. 2 chemical stock rooms and analytical instruments.	Labs need updating and maintenance (43.5K/yr). If the Biochemistry program is to succeed, a new lab is needed: 6-40K to start 3-4K/yr to maintain.
Physics	CVD aluminum and tantalum labs; Graduate student lab; Acoustic sensor lab; Astronomy teaching; Biophysics; Wafer and Characterization; Optoelectronics, photonics and terahertz; Telescope project; Sirenko's lab; Laser and x-ray diffraction.	~2K sq. ft. ~1500 sq. ft.; ~400 sq. ft. ~1300 sq. ft.; ~1200 sq. ft. ~1700 sq. ft. ~300 sq. ft.; ~650 sq. ft. ~200 sq. ft.
Mathematical Sciences	Capstone Lab	Room 514 Cullimore Hall See Table 9.4.1

9.1 Administrative [From facilities data – with future needs]

9.1.1 Instructional Staff offices

While it would be best to have all colleagues in a given department and the department's graduate students situated on the same or contiguous floors, this is not always possible. However, we are doing reasonably well in CSLA in this regard. Our faculty members have office space, but there may well be a space crunch as our programs and thus our faculty size grows.

9.1.1.1 Tenure-track

Issues concerning departmental needs with respect to offices for tenure track faculty are presented in this subsection.

Table 9.1.1 Tenure-track

Department or Division	Tenure-track space
Biology	There are two administrative offices shared by the four faculty members: Cullimore 521 and 626.
Chemistry and Environmental Science	Lab space for new faculty is needed.
History	Beginning in 2004, History faculty moved into a row of offices on the third floor of Cullimore Hall. All the tenure-track faculty are currently accommodated along the west wing of that floor (rooms 321–329). When the department's administrative/program coordinator moves from room 322 to room 334 (see ii.2 below), one faculty office will be freed up for new History faculty. In addition, two offices on the east wing of the third floor of Cullimore Hall, currently being used by lecturers in the Humanities Department, are earmarked for History faculty when new hires are made. Some readjustment of space which is in progress should lead to adequate well aligned office space for all current faculty as well as enabling some departmental growth.
Humanities	The Humanities Department currently has space on the 4th, 3rd, and 2nd floors of Cullimore Hall. All faculty have private offices. There will be a need for more office space when the department grows as there currently are no available offices.
Mathematical Sciences	The Department of Mathematical Sciences (DMS), including the Division of Biological Sciences, occupies the second, fifth (except for the CSLA Dean's suite), and sixth floors of Cullimore Hall. Tenure-track Faculty have offices on all three floors. DMS was awarded a Strategic Initiative Grant from NJIT to promote the Department to National Prominence, and that award clearly focuses on the need for additional personnel (added faculty, additional visiting professors and post-docs, major increases in the number of undergraduate and graduate students, additional administrative staff), increased number of visitors, and showcasing the DMS through workshops, conferences, and seminars. Also, the DMS has been given the responsibility to run the Biology Program at NJIT. This required the assignment of offices for the Director of the Division of Biological Sciences and for an Academic Coordinator.
Physics	The 17 tenure track faculty have offices but as this highly productive department grows, each of the 8 desired new faculty members will require an office (8X225=1800 sq. ft over 5 years).

9.1.1.2 Non-tenure track

Table 9.1.1.2 Non-tenure track

Department or Division	Non-tenure track space.
Biology	Graduate students occupy and/or share space with the advisor.
Chemistry and Env. Science	There is a need for an office for an incoming special lecturer.
History	The department's only Special Lecturer has an office along the west wing of Cullimore Hall. Adjuncts are accommodated in an all-purpose room (321) that has two desks for their use.
Humanities	With the completion of the move of the Language Learning Center to 115, all full-time faculty and instructional staff will have private offices with the exception of two university lecturers who share a large office with each other, a copier machine and departmental mailboxes. With the movement of the policy science faculty, most Humanities faculty are now housed on the 3rd and 4th floor of Cullimore Hall. A large space (Room 331) with 12 desks is used for adjunct faculty, especially during the fall term, when we have many more adjuncts than in the spring (20 to 8). Graduate students also use the desks in 331. Future needs: if and when new faculty lines are available to support the expected growth in our Communication programs, we will again be searching for office space to accommodate them.
Mathematical Sciences	Non-tenure-track personnel, including Special Lecturers, Lecturers, and Adjuncts have offices on the second floor, and our two Postdoctoral Fellows occupy offices on the fifth and sixth floors.

9.1.1.3 Graduate Students

Table 9.1.1.3 Graduate Students

Department or Division	Graduate Students.
Biology	The main administrative office for biology is Cullimore 627. The Director of Biology occupies Cullimore 626. Biology has access to the meeting room in 611.
History	The joint Rutgers-Newark/NJIT graduate program in History is housed at Rutgers-Newark, and they therefore do not have to be accommodated at NJIT.
Humanities	Graduate students have space available in 331 Cullimore, dependant upon the number of adjunct instructors in a given semester.
Mathematical Sciences	Our supported Graduate Students have offices on the second and fifth floors. Graduate students need to be located close to faculty so there are constant interactions between them to maximize the mentoring done by faculty.

	Presently, our graduate students are scattered on two floors in Cullimore Hall in facilities that are not academically stimulating environments. Those students who are in the final stages of their thesis work should be located close to their advisors. For these students, frequent meetings between student and advisor will be facilitated by close physical proximity.
Physics	There are a total of 35 graduate students in the Applied Physics Program. Most of the students are located in either 402T or 403T, which are large rooms with cubicles. A few students have their offices located in selected laboratories, depending on their research and their advisor.

9.1.2 Administration Offices

Table 9.1.2 Administration Offices

Department or Division	Administration Offices
Biology	The Academic Coordinator for Biology occupies the main administrative office in Cullimore 627. The Director and one advisor share Cullimore 626.
Humanities	The main office of the Humanities Department is on the 4th floor of Cullimore Hall (431). Housed within this area are offices for the Chair, Associate Chair and Administrative Coordinator as well as a work area for the departmental secretary.
Mathematical Sciences	On the sixth floor, the Departmental office, with the chair and five staff members, occupies a corner suite and the Division of Biological Sciences office, with the director and one staff member, occupies two faculty offices. In addition, there is a seminar/meeting room in 611 Cullimore Hall and a Reading Room adjacent to this.
Physics	Physics Administrative Office is located in 463T – This is the Physics Office and it houses Renee Crawley, Assistant to the Chair, Leslie Williams, in charge of the FRS program and the Grant & Contract financial records and Jennifer Valenti, Customer Service Representative. Physics Conference Room is located in 453T.

9.1.2.1 Meeting rooms

It would be desirable for all departments to have a large lecture room with modern technology for seminars, but which also fosters interaction; a conference room for departmental meetings and rooms for small research groups to meet.

Table 9.1.2.1 Meeting rooms

Department or Division	Meeting rooms
History	The department has a seminar/conference room in 307 Cullimore, and the all-purpose room used by adjuncts (321) can also be used for small meetings.

Humanities	Rooms needed—the Department now has control over a large conference room (411 Cull.), used for meetings and small classes; a smaller conference room (407 Cull.), used for meeting and classes of fewer than 12 people; a computer lab (315 Cull.) with 12 work stations. As we develop our planned track in music and technology, the need for a secure space to house the equipment and to allow access to faculty and students will become paramount.
Mathematical Sciences	The present 611 Cullimore Hall requires a major renovation to make it into a first class seminar room. Specifically, there is a need to improve the lighting, to provide alternative board space as well as screen for presentations, to have a ceiling installed data projector, and to have adequate seating and writing space. The technology aspects of this room need major updating. The Computer Laboratory adjacent to 611 Cullimore Hall also needs its technology updated. This room cannot be used as a teaching laboratory because of inadequate means to show visual aids. There also is a need to renovate the office space on the fifth floor for several of our Graduate Students. The lighting needs improvement and the space is not ventilated very well as well as not being used efficiently. There are poorly designed rooms adjacent to this room, one of which is a windowless room occupied by a postdoctoral fellow. Furthermore, the Capstone Laboratory on the fifth floor needs to be redesigned to provide an adequate multipurpose room for storage and performance of a variety of experiments for our Capstone courses. This room also needs its technology updated.
Physics	The Physics department needs a seminar room. The existing conference room accommodates about 15 people. A facility with Internet access, projector and screen and that accommodates 35 people is needed.

9.1.2.2 Staff offices

Department offices should have separate offices for the chair, and other personnel, such as, associate chair, academic advisor, assistant to the chair and office manager all in one contiguous space. These offices should be equipped with appropriate technology and furniture and have room for a work study student. The environment should be professional and comfortable and have enough room for typical needs. Departmental hallways should have display cases for notices, media coverage, publications, etc.

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Table 9.1.2.2 Staff offices

Department or Division	Staff offices
History	History needs remodeling of space to provide adequate departmental administrative office (Room 332 Cullimore) at nominal cost. The department's administrative/program coordinator currently has an office along the west wing of the third floor of Cullimore Hall (322). The department's part-time secretary occupies another office (332) on another, more heavily trafficked part of the third floor of Cullimore, directly across from the elevators. 332 also contains the department's mailboxes and supplies, as well as some shared office equipment and three carrels for adjuncts, and the department's new display board is directly outside of it. Future needs: Room 332 should be made into History's central departmental administrative office, housing both the part-time secretary and the administrative/program coordinator. This can be done at nominal cost by converting the area with carrels that currently are hardly ever used into a closed office for the administrative/program coordinator.
Humanities	The main departmental office (431 Cullimore) now contains the reception area for the department staff, the offices of the chair, associate chair, and administrative coordinator. The undergraduate advisor, ESL program directors, director of composition, and the theatre director all have separate offices. The theatre director's office is especially small and, hence, cluttered. A larger office space within Kupfrian Hall is needed.
Mathematical Sciences	The Departmental office has been reorganized to make it more efficient from the point of view of visitors, students, and faculty.

9.2 Instructional [Facilities data with future needs]

The teaching facilities are integral to the delivery of curriculum and thus careful consideration should be given to the construction of the physical learning environment. Learning spaces can enhance or detract from the learning process in similar ways as the style of teaching, the material being presented, or the interest of the individual student. Just as the curriculum, its content, and style of instruction can be evaluated and updated so can the learning space. It is possible to construct the physical learning environment to be adaptive and responsive to the instructional needs. The range of activities within a classroom is greatly affected by its size. A good classroom allows the possibility for instructor control; the larger the room the more flexibility and the smaller, the more personal. Both large and small classroom types are needed for the delivery of the curriculum. For example, movable wall devices can accommodate many different sizes. Being able to adapt learning environments to individual pedagogical needs increases the opportunity for successful student learning. Even less complex aspects of attributes of classroom design is important to the learning process. Light sources as well as their operational methods and even temperature control and ventilation

within the classroom play an important role in the comfort of the students and teachers for the purpose of learning.

At NJIT, among the most important aspects of this is the size of such space. The university's teaching spaces and facilities consist of classrooms, lecture halls and laboratories. The overwhelming majority of courses run in classrooms with a capacity ranging between 40 to 60 seats. Specifically, we have 48 classrooms with a 40 seat capacity; 23 larger classrooms with 40-60 seat capacity; 10 medium size lecture halls with a 60-100 seat capacity, 4 lecture halls with a 116 seat capacity; and one (1) large lecture hall with 164 seat capacity. Although the range and quality of our teaching facilities are mostly adequate (some of the rooms have an old, dilapidated look and feel), continual investment should be made in our teaching and learning support services. The design of additional teaching spaces with computing, network and educational technology equipment is needed, as is a maintenance plan for the day-to-day maintenance of educational physical infrastructure.

CSLA offers courses using a variety of formats ranging from the large, such as the lower-level sequence of physics and chemistry courses, to the small, such as the humanities capstones. There are also those that run completely in lecture style, others that combine lecture and recitation, and those that include a lab component. A small number of our courses are delivered through distance learning.

An inventory of lecture halls, classroom space, laboratories, equipment and other physical facilities for education must be taken as a first step toward making an accurate determination of the current state and an efficient decision regarding needed additions and renovations to optimize the teaching and learning environment.

9.2.1 Rooms needed

9.2.1.1 Number, size, and layout needs

If NJIT is to achieve its goals of expanding the student body while providing high quality education at a reasonable price, class size may well need to be increased. (This must be done carefully as student faculty interaction is important for optimal learning). Thus, we will need to have more classrooms that hold more than 40 students. Also, modern technology is needed, such as technology that enables real time evaluation of student understanding (clickers). NJIT must decide on a particular system to use throughout the university.

Table 9.2.1 Rooms needed

Department or Division	Rooms needed
History	The third floor of Cullimore Hall contains a very large interior room that was formerly used as a statistics lab but is now seriously under-utilized. We would like to see that room converted into a large seminar room, seating at least 22 students, so that it can be used for History and Humanities capstone seminars

	throughout the day and evening.
Humanities	The planned track in music and technology will require a secure space to house equipment and allow access to faculty and students. Furthermore, the space will ideally be soundproofed. The Humanities Writing Lab/Computer Lab (315) is nicely equipped with fairly new computers, but is small (capacity is 16).
Mathematical Sciences	Several years ago, the Master Plan included the renovation of the 2nd floor of Cullimore Hall, and we request the Senior Administration to consider fulfilling this goal. This will give Mathematical Sciences the opportunity to move more easily towards National Prominence. Our preferred plan would be to have contiguous office space to house the DMS and Biology Program faculty, staff, and graduate students. The second floor of Cullimore Hall is the largest of the three floors, but presently there are serious deficiencies with the floor plan. Originally designed for and occupied by University administrative personnel, security was an important issue, thereby dictating limited access to the offices from the outside hallway. However, once inside, security considerations were no longer paramount resulting in many open carrels and open space for staff. The offices on the west side of the second floor now are occupied by faculty and the open carrels with no security are occupied by graduate students. Presently, access to teaching faculty by students is severely limited as a result of locked doors that require a phone call to be made by the student to access the faculty member's office. On the east side of the second floor of Cullimore Hall, there are several windowed offices occupied by faculty members, including Special Lecturers, but the remaining spaces are filled with desks for use by Lecturers. There is a suite of offices and carrels at the south end of Cullimore Hall that is occupied by Statistics faculty members, including Special Lecturers and Graduate Students. All of these offices have the same problem of restricted access by students.
Physics	At the present time, the physics faculty totals 17. We anticipate that the faculty will grow – this will require additional faculty offices. Additional faculty in the following areas will be sought: Solar faculty member to be hired in September 2006 Theorist to be hired in September 2006 Biophysicist Optics Specialist MEMS Specialist Condensed matter Physicist Material Scientist

9.2.2 Technology needs

Table 9.2.2 Technology needs

Department or Division	Technology needs
Chemistry and Environmental Science	Laboratory upgrade for teaching. It has been years since many of our instruments have been upgraded. Many of the computers are too old.
Humanities	The irresistible drive toward new teaching/ learning technology requires that faculty and staff maintain up-to-date computers with the capacity to take advantage of educational innovations. New computers are needed for the Language Learning Center, additional computers for the computer lab, and the university lecturers are working, for the most part, with older computers.
Mathematical Sciences	The seminar room, 611 Cullimore Hall requires a technological upgrading, in addition to the major renovation mentioned earlier. A ceiling data projector is needed along with adequate electronic power outlets and computer connections.
Physics	We do require a Seminar Room. The existing conference room we have only accommodates approximately 15 people and we require an additional facility that could accommodate approximately 35 people. The room should also have Internet access and should include a projector and screen.

9.3 Infrastructure [Needs consistent with goals]

9.3.1 Maintenance of existing

The Physics department has been very successful in obtaining external funds to purchase high tech equipment for research. However, the grants do not provide for the costs of maintaining this equipment. To adequately maintain existing NJIT equipment $100,000/year must be budgeted. In addition, there is a need for $10,000/year to maintain the upper division Physics teaching Lab, and $5,000/year to maintain the lower division Physics teaching Labs. Many of the existing experiments are 25 years old and the computers are 5 to 7 years old. Ideally, funds should be appropriated to update the experimental apparatuses.

Table 9.3.1 Infrastructure

Department or Division	Infrastructure needs
Humanities	Deferred maintenance has led to a generally decrepit look to many of the classrooms we use regularly—in Cullimore (110/111), Kupfrian, and especially Faculty Hall (3rd and 4th floors). This is especially depressing to students, who spend far more time in classrooms than do faculty.
Mathematical Sciences	The Department of Mathematical Sciences has a large group of Faculty and Graduate Students, and there are multiple needs for seminar and discussion rooms. At present, these needs are satisfied solely by 611 Cullimore Hall. There is a strong need and urgency to completely renovate the second floor of

	Cullimore Hall to make it into an efficient cluster of Faculty offices accessible to students, to house our increasing number of Graduate Students, and provide additional seminar and discussion rooms. The width of the second floor is wider than those of the fifth and sixth floors, and therefore, the inner core could be used for multipurpose seminar, meeting, and discussion rooms. Furthermore, there is a need to establish separate administration offices for the Biology Program, which has an ever increasing number of student majors.
Physics	Infrastructure Needs: • Maintenance of existing NJIT equipment $100,000/year • Maintenance of upper division Physics teaching Lab $10,000/year • Maintenance of lower division Physics teaching labs $5,000/year • Many of the existing experiments are 25 years old and the computers are 5 to 7 years old. • New Acquisitions – Faculty members that we anticipate hiring will require research laboratories. We anticipate an average lab size of 750 square feet.

9.3.2 New acquisitions or installations

Faculty, Staff and Ph.D. Student Lounge

The community needs a social space. The community lounge would have kitchen facilities (microwave, stove, refrigerator, sink, coffee station), comfortable lounge chairs, a sofa, as well as 2 tables that each sit 4-5 people. The lounge chairs and sofa should comfortably fit 15-20 people so the department can gather for coffee a few times a week. We note that our colleagues in Europe (and in the Mathematical Sciences Department) often gather for coffee breaks once a day (faculty and Ph.D. students), which is an important factor in department cohesion

9.3.3 Computing resources

Humanities: Faculty need up-to-date computers to take advantage of educational innovations, as do university lecturers. Humanities has been averaging 9 new computers per calendar year for faculty/lecturers, while 12 would be more reasonable to stay on a 3 year cycle of machine replacement.

9.4 Research [Facilities data, with future needs]

Research facility needs arise mainly in two ways. First, new faculty members need new laboratories and, second, faculty need to have up-to-date equipment at somewhat regular intervals to perform state of the art research.

9.4.1 Laboratory resources

Table 9.4.1 Laboratory

Department or Division	Laboratory space
Chemistry and Environmental Science	The department offers a variety of laboratory courses including freshman chemistry. The main laboratories are the Instrumentation labs, Organic Chemistry lab, Freshman Lab, Physical Chemistry Lab, Computational Chemistry lab. There also exist two chemical stock rooms. There exist a variety of analytical instruments. Nothing in these laboratories has been updated in the last 5-7 years, and many require immediate attention. In some respects, they are short of falling apart. <u>Lower Level Physical, Analytical, and Organic Laboratories</u>: These laboratories serve 120-160 students per year. Students spend 4 hours per week. Small and major equipment cost includes replacement of equipments that are reaching the end of their operational life. 1. Glassware: $ 2,000, 2. Gases Cylinders: $ 500 3. Chemicals: $ 2,000 4. Disposable Supplies: $ 1,000 5. Small Equipment (heaters, stirrers, heating mantles, variances): $ 4,000 6. Sensors (Ph, conductivity, temperature, pressure): $ 500 7. Major equipment (10 year replacement cycle, balances, computers, vacuum pumps): $ 7500 8. Maintenances: $ 1,000 Total- $ 17000 per year Cost Per student: $ 131/year <u>Freshman and Chemical Technology Laboratory:</u> The freshman laboratory serves 400 students per year. Students spend 3 hours per week. 1. Balance replacement: $2000 (per year for three years) 2. Chemicals: $1500 per year 3. General lab supplies: $2500 per year (such as glassware, thermometers, pipettes, waste bottles...). Total- $ 6000 per year Cost Per student: $ 15/year <u>Analytical Chemistry Laboratory:</u> This laboratory serves senior and graduate level chemistry and environmental science students. It is the showpiece laboratory with advanced instrumentation. Right now about 40 students per year take this lab, but the demand for these classes is high (number of students are limited) and the enrollment can be increased. The requirements presented here include a one-time purchase of an

HPLC instrument.

1. Major Equipment need (HPLC): $ 40000
2. Annual Maintenance: $ 1500
3. Gases: $ 1000
4. Supplies: $ 1000
4. Balance: $3000 (one per year)
5. Computers: $ 1000 (one per year)

Total- $ 7500 per year
Cost Per student: $ 187.5 /year

Computational Chemistry Laboratory

The purpose of this document is to estimate the hardware/software and physical space needs of the department to improve the level of computational chemistry instruction over a three-year period. The software and hardware would be used in a variety of undergraduate and graduate courses taught by Professors Gund, Skawinski, Bozzelli, Farinas, Krasnoperov, Gorun, Ellis, and Venanzi (General Chemistry, Physical Chemistry, Organic Chemistry, Biochemistry, Computational Chemistry, and Inorganic Chemistry).

LABORATORY SPACE AND TEACHING ASSISTANTS: The Computational Chemistry Lab should be located in a smart "classroom" in Tiernan. The lab should be open to the students during a wide range of posted hours. It should be staffed with teaching assistants familiar with the software and course applications. The lab should have appropriate/adjustable lighting to avoid screen glare, as well as air-conditioning and sufficient tables and chairs to allow 2 students/ computer when necessary. The computers should be connected to the campus network. Wi-fi access should also be available.

YEAR I	
10 network-ready pc's & maintenance	$8,000
Software licenses & maintenance	$7,200
Color laser printer & supplies & maintenance	$2,600
YEAR I TOTAL	$17,800
YEAR II	
10 network-ready pc's & maintenance	$8,000
Software licenses & maintenance	$4,000
Printer supplies & maintenance	$2,000
YEAR II TOTAL	$14,000
YEAR III	
Software licenses & maintenance	$4,000
Printer supplies & maintenance	$2,000
YEAR III TOTAL	$6,000

THREE-YEAR TOTAL: $37,800

Development of the Biochemistry Lab:

This lab is key to the development of a new Biochemistry program within the

	department. This lab is expected toss serve about 40 students a year. The one time cost for the biochemistry lab would be approximately $35,000-45,000. However, the bare minimum would be as follows: microfuge ($1,500), electrophoresis with power supply ($700 ; 1 per 4 students), water bath ($700), camera and UV transillumator ($2,500), pipet set ($1000; 1 set per 2 students). Several large expenses are required to complete the laboratory: High-speed centrifuge (>$20,000), autoclave ($8,000), and themocycler ($5,000). The total cost minimum one time cost would be ~ $6,400. The cost of chemicals would be ~ 3000/year.
Humanities	The computer lab in 315 was recently updated and is now serving the needs of our Communication majors although the room has a limited capacity. Growth in the new music and technology track will require additional lab space; 311 Cullimore may be suitable in this area. Research facilities for Humanities faculty tend to be library-based, and although the Van Houten library is not strong in its holdings in our disciplines, inter-office loans and data-base accessibility serve our needs reasonably well.
Mathematical Sciences	On the fifth floor, there is a Capstone Laboratory, initially funded by NSF, and for which additional equipment is being purchased. There are three rooms for Graduate Students. There is a computer lab in Room 615 Cullimore for use by faculty and graduate students. The room includes 4 PCs, 14 workstations and 2 laser printers.
Physics	As noted in section 9.3.2, the new faculty members that are anticipated over the next five years will require research laboratories. With an average lab size of 750 square feet, we need 6,000 square feet of lab space. Two faculty members have outgrown their lab space and will require the addition of two new 500 sq. ft. labs. Research Facilities – The 7 new faculty members that we anticipate hiring will require research laboratories. We anticipate an average lab size of 750 square feet, totaling 6,000 square feet needed. Additionally, Trevor Tyson requires an additional lab of 500 square feet as he has outgrown his current lab space. Furthermore, Dale Gary requires a new lab of 500 square feet as his current quarters are only 225 square feet. The existing research lab facilities are as follows: Roland Levy – Roland has B4T and B5T. These labs are used for CVD of aluminum and tantalum and there are grants supporting these facilities amounting to $243,000/year. The space totals 1,976 square feet. Ken Chin – Ken has a part of B1Td that he shares with Gordon Thomas. This lab is used for graduate student PhD projects. Additionally, he has 207 MIC. Ken is using this room for his PSE&G work involving an acoustic sensor which is used to detect a failing electrical transformer. His funding at the present time is $233,000/year. The space totals 1,462 square feet. Haimin Wang and Carsten Denker – Haimin and Carsten share a fifth floor lab located in Faculty Memorial Hall that is used as a teaching lab for various Astronomy experiments, which are used in Physics 202A and 203A. The space

	totals 409 square feet. Gordon Thomas - Gordon has B1T a, b, and c where he is performing a number of experiments with PhD students in the area of Biophysics. Gordon has funding of $231,000/year. The space totals 1,307 square feet. N.M. Ravindra - Ravi has 418T and 414T which supports his wafer and characterization studies. His grants, supporting his work, total $90,000/year. The space totals 1,179 square feet. John Federici – John has only one lab and that is B15/16. John's work is in the area of optoelectronics and photonics and his terahertz work is funded to the tune of $837,000. The space totals 1,700 square feet. Carsten Denker – Carsten has one small lab which is 405T and it is used for a funded telescope project. The lab is one of the smallest in the physics inventory and the lab is used efficiently. Carsten's total funding is $263,000 and many of his projects are at Big Bear Observatory. The space totals 266 square feet. Andrei Sirenko – Andrei has all of his equipment in one lab which is B11T. Most of the equipment he has purchased for 10 cents on the dollar. The lab is well equipped and Andrei has just been awarded a Career Award. The space totals 658 square feet. Trevor Tyson – Trevor has a lab in 304T where he has a laser setup and an x-ray diffract meter. His second lab in 316T is where his furnaces are located. Trevor's grants total $216,000. The space totals 1,090 square feet. Tao Zhou – Tao has a laser lab in B3T. At this point he is using ½ of the lab for his apparatus. The other half will be used over the next year as a teaching lab for a high level photonics lab that John Federici will teach. Tao is only in his second year at NJIT and has no grants at this time. The space totals 919 square feet.

9.4.2 Office

Each department should have an office for visitors or postdocs. These offices should be well equipped. While sometimes the office of a faculty member on sabbatical may be available, this should not be counted upon.

Table 9.4.2 Non-tenure track

Department or Division	Non-tenure track space
Chemistry and Env. Science	Dr. Roumiana Petrova who is joining the department as a Special Lecturer needs an office.
Humanities	Humanities has 331 Cullimore which houses adjunct instructors.
Mathematical Sciences	4 Lecturers: John Hunter, Soroosh Mohebbi, Joseph Zaleski, and Soha Abdeljaber all have desks in an open area, and are in need of offices.

10. Budget

10.1 Current year

CSLA was provided aggregate budgets of $19.5M, $19.9M, and $21.6M for the fiscal years ending 2003, 2004, 2005 respectively. The overall budget represented a 2.2% increase from 2003-2004 and an 8% increase from 2004-2005. Nearly all of the increases are attributable to new faculty hire, predominantly in Math, as a result of the Strategic Plan to bring the Mathematical Sciences Department to a level of national prominence. In fact, approximately only 8% of the college's overall budget is not obligated for salaries. The budget, and actual variance for Fiscal 2005, is broken out as follows. Please note that the numbers do not include adjunct expenditures which are addressed separately.

The total non-personnel expenditures for CSLA for the Fiscal Year ended 7/05 was $317,927. This represents the expenditures for the five academic departments plus ROTC and the Biology program. It does not include centers or research related cost centers. Material Science has been backed out.

Table 10.1.1 Budget and Variance for Fiscal 2005 for CSLA in thousands (not including adjuncts)

F'05	Budget	Variance from budget	
CSLA	$ 551	-45	
AFROTC	$ 20	-12	
BIOL	$ 239	-29	
CHEM	$ 2,697	-13	
HIST	$ 743	-2	*
HUM	$ 3,312	-15	
MATH	$ 6,715	-27	
PHYS	$ 3,968	-9	**
Total Shortfall in budget		-152	

* This is adjusted. Actual variance was +9 which was due to a reduction in faculty salary due to a leave of absence

** This is adjusted. Actual variance was 382K which was due to loss of faculty that was not immediately replaced plus a long term disability of staff member

Of the total $152K shortfall in budget, $140K was money CSLA spent in summer administration expenses. No budget has been provided for this. Instead this is processed through the Provost's Office but run through our account.

In addition to the summer administration expenses, there were many needs that are recurring but for which we do not receive a budget; rather, a "one time" transfer is made at the time of the expense. This practice seriously impedes

responsible fiscal planning and obtaining the funds (pleading for it on each occasion) is a very inefficient use of people's time. Because of such unbudgeted expenses, CSLA overspent the originally allocated budget. Some examples of non personnel costs expensed, but not budgeted included:

Table 10.1.2 Examples of recurring unbudgeted items

Advertising for faculty candidates	$8K
Restock Chem. & Physics Fresh Labs	$15K
Career Day	$6K
Deans Day	$3K
Total	$32K

10.2 Projections

CSLA's non personnel budget (as defined above) for Fiscal 2006 is $331,784. It should be noted that the budget reflects the 5% University wide reduction. The increase over last year is attributable to the increased Strategic Funds for the Mathematical Sciences Department. To date the college has realized the following unbudgeted expenses:

Table 10.2.1 Unbudgeted CSLA expenses 2005-2006 academic year

EVSC 613- Food	$3K
ENVS 613- Copying	$4K
MTSE- CSLA add'l Contribution	$3K (non-recurring)
Joint Career Day	$11K
Biology Rutgers T/A increases	$5K

In Summary: CSLA is in need of an additional $ 44K in recurring non personnel working capital allocation. That is $32K as listed in Table 9.a.2 and the first, second and final items of Table 10.2.1 (as one item is non-recurring and another overlaps an item in Table 10.1.2).

Historically, the adjunct budget has been determined based on prior history, plus the anticipation of research academic year release time savings. Several adverse events have caused a serious strain on the adjunct budget. The College has been realizing decreasing release time savings in recent years. This is attributable to the fact that funding agencies have been reluctant fund this release and also the university's decision to not match this expense unless required. Coupled with this phenomenon is the high growth in the research programs within several of our departments. This results in a decrease in teaching requirements for our research active faculty. In addition, the total allocated budget for the past three years is significantly less than in prior years. And lastly, we have experienced a significant increased need for remedial course work in the GUR courses. By necessity, these classes have to be relatively small or retention would severely be impacted. In Table 10.2.2, we present adjunct costs over the past several years.

Table 10.2.2 Adjunct Budget vs. Expenditures

	Net Original Budget	Actual Expense	Shortfall
F04	$325,000	$528,689	$203,689
F05	$499,000	$565,473	$66,473
F06	$509,994	$610,326	$100,332

CSLA is in need of an Academic Year Adjunct Budget of approximately $665K with no reduction attributable to release time savings, which are too capricious to properly allow the College to manage efficient cash flow.

In summary, the College of Science and Liberal Arts appreciates the support that it has been given in the past, but in order to continue its growth in enrollment, it must received adequate funding. The College's Strategic Plan is realistic and achievable. CSLA is nimble and has positioned itself in the past couple of years to "think out of the box" and offer a plethora of novel academic alternatives to today's youth. The faculty and staff have the talent and desire to do so. But lack of sufficient resources is holding us back. The following recurring needs have been identified as integral to achieving our goals:

Table 10.2.3

Recruitment/Marketing	Adjust based on my 60K number	
	Career Day	6K
	Deans Day	4K
	Mailings	7K
	Recruitment printing	7K
	Giveaways	3K
	TOTAL	$27K
Faculty Recruitment		
	Advertising	10K
	Campus interview	8K
	NEW FTE's / year	TBD
	2 Start-up packages	TBD
	TOTAL	$18K+(TBD)
Summer Administrative Pay		$140K
Course Maintenance		
	Freshman Chemistry Lab supplies/breakage	8K
	Freshman Physics Lab supplies/breakage	8K
	Env Sci Grad Program	7K
	TOTAL	$23K
Remedial Course Tutorial Instructional		7K

Basic Skills and ESL needed increase		7K
GRAND TOTAL		

The College must engage in more focused short- and long- term financial planning and expand development and outreach activities in order to achieve its goals in education and research. Additional sources of funding must be found if we are to succeed. The amount of funds necessary for CSLA to reach its short term and long term goals is likely to outstrip the amounts available from our current sources of support from the state, tuition, and research grants. It is imperative a plan be drafted to devise strategies to help with meeting our anticipated financial needs, including increased institutional support, and targeted fundraising activities as described in the following section.

11. External advisory committee

In 2004, the CSLA Board of Visitors was a board in name only, with three members in total, inactive for the most part, and little understanding of the needs of the College. We have spent the last two years working on rebuilding the Board utilizing a three prong approach of removing members who were not participating, reengaging those members who we believed would help us move forward, and recruiting additional members to work with us on realizing the new vision for CSLA.

11.1 Membership and associations

Currently, the board has nine active members, but we have plans to eventually increase that number to about twenty in order to be most effective. The composition of the board reflects the unique qualities of the College, with members from industries and corporations which hire our graduates. Currently, there are representatives from the energy, financial, legal, pharmaceutical, and optical industries. In order to be more effective in its role as an advisory board, new members need to be recruited from additional industries which are not yet represented - environmental science, banking, media and insurance.

NJIT has many prominent alumni across a wide spectrum of industries. We are considering inviting a representative group of CSLA graduates and other NJIT alumni who have an interest in the mission of CSLA/NJIT. Both the Dean and board members are working to identify alumni who will be asked to participate on the advisory board.

Mr. Frank J. Cassidy ’69, Board Chair, President/COO, PSEG Power LLC, Newark, NJ 07102

Stan Brown, Ph.D., President, Brown Global Enterprise L.L.C., Chatham, NJ 07928

Dr. Roger Cubicciotti, Ph.D., President, NanoMedia Inc. Montclair, NJ 07042

Ms. Jerry F. English, Esq., Cooper, Rose & English, LLP Summit, NJ 07901

Mark Kahn, Vice President Asset Servicing (SST), JP Morgan Chase Bank, New York, NY 10004

Donald Kyle, Ph.D., Executive Director, Computational Combinatorial and Medicinal Chemistry, Purdue Pharma L.P., Cranbury, NJ 08512

John Poate, Ph.D., Vice President and CTO, Axcelis Technologies Inc, Beverly, MA 01915

John Stack, President/COO, Edmund Industrial Optics, Barrington, NJ 08007

Walter Weissman, Senior Scientific Advisor for Corporate Strategic Research, ExxonMobil, Annandale, NJ 08801

11.2 Activities

Traditionally, CSLA’s board met once a year, but in order to further engage the board we began meeting as a group on a more regular basis. The Dean also meets with individuals routinely. This provides our board members the opportunity to

hear about the direction and needs of the College and how various issues, both internal and external, are being addressed. On several occasions, we have invited our board members to meet with College faculty to discuss their work and how it relates to the needs of industry. At our most recent board meeting, members had the opportunity to interact with faculty as they made presentations on their on-going research activities and priorities. We will be having similar meetings of the board with CSLA students.

We have also succeeded in having board members participate in our fundraising activities, both on the personal and professional levels. The companies of two of our board members have provided us with scholarships to attract freshmen – Edmunds Industrial Optics gave us $5000 and ExxonMobil gave us $10,000 with a promise of $10,000 more in 2006. Similar arrangements are being discussed with the companies of other members.

11.3 Potential new members

At a recent board meeting, two sub-committees were created to address some of the most pressing needs of the college:

1. Resource/Financial Development – charged with recruiting new members to the board and with setting financial goals and implementing strategies for achieving them.
2. Community/Corporate Outreach – charged with reaching out to the business community to establish mutually beneficial relationships between CSLA/NJIT and the corporate community.

Ideally, a full-time development officer should be assigned to CSLA (we now have a half-time position, which recently became vacant). This person will work with the Dean and the Chairs on creating opportunities to enhance the financial environment necessary for achieving our goals. Fundraising efforts for new scholarships, fellowships, sponsored chairs, laboratories, and other needs will be further enhanced.

The College of Science and Liberal Arts Strategic Plan

January 2005-December 2009

Introduction

The College of Science and Liberal Arts was formed in 1982. It was then known as The Third College because it had been preceded by NJIT's Newark College of Engineering and the New Jersey School of Architecture. Growing steadily ever since, CSLA has spawned two of NJIT's six schools and colleges: the Albert Dorman Honors College, which evolved out of the Honors Program that was founded in CSLA in 1985, and the College of Computing Sciences, which developed out of CSLA's Computer and Information Science Department. In 1986 the name of the College was changed to The College of Science and Liberal Arts as a result of a more sharply defined mission and direction. Great expansion followed and today the college consists of six academic departments - Chemistry and Environmental Science, Federated Biology, Federated History, Humanities and Social Sciences, Mathematical Sciences, and Physics - all of which are active not only in educating our students but also in research. CSLA also houses the Department of Aerospace Studies, the NJIT component of the Rutgers/NJIT Theatre Arts Program, the Interdisciplinary Program in Materials Science, the Center for Applied Mathematics and Statistics, the Microelectronics Research Center, and the Center for Solar Research - which operates the Big Bear Solar Observatory and Owen's Valley Solar Array, acquired from California Institute of Technology in 1997.

CSLA is distinct among the colleges and schools of NJIT in terms of its breadth and the interconnections it fosters among diverse disciplines in the sciences and the liberal arts. The boundaries between the College's academic departments and programs are flexible and the common commitment to the General University Requirements brings an exceptional unity to the various interacting parts of CSLA.

This strategic plan, while it cannot encapsulate all the aspirations and needs that exist within the College, addresses specific priorities, which are important to the quality of the College as a whole and will have a positive impact at this point in our history. The College aspires to be a highly productive organization that supports the university's mission and thus our priorities coordinate well with the NJIT's strategic plan.

Mission

The College of Science and Liberal Arts (CSLA) addresses the complexities of modern life at the intersection of science, technology, and human values, and provides the intellectual foundations necessary to understand and analyze them. CSLA is dedicated to instruction that develops fundamental principles, informed and enriched by research that encourages innovation, enabling students to formulate significant questions, think analytically, offer creative solutions, and communicate them effectively. The mission of the College is to:

- Provide all undergraduates with the fundamentals needed for lifelong learning through the General University Requirements, superior and inspiring learning experiences, and dedicated teaching;

- Prepare the next generation of leaders by providing a broad array of undergraduate and graduate programs and professional education opportunities.

- Conduct highest caliber scholarly research in the biological, mathematical, physical and social sciences; history and the humanities, and engaging students, academic, corporate and government partners in this research;

- Support the university's Albert Dorman Honors College in offering an enriching environment for its academically talented students, enhancing their college experiences through an intellectually challenging and engaging curriculum;

- Advance multi-disciplinary interactions - within the College, university and with the larger academic and technology communities - in research, teaching, economic development and the creation of intellectual property in order to address emerging contemporary issues.

CSLA provides academic programs that span the sciences and the liberal arts. The College educates students to be knowledgeable citizens who are able to meet the challenges of a changing world, have a global perspective, and realize their full potential as individuals and members of a technological and diverse society.

Vision

CSLA is committed to a rigorous, broad, and relevant core curriculum in the sciences and liberal arts that lays the foundation for professional and personal fulfillment for all students, offering programs with emphasis on cross-disciplinary interactions that reflect the interests of students and the demands of the modern world, and conducting scholarship in traditional and emerging directions.

Overview

All of the departments in CSLA offer Bachelor's and Master's degree programs. Doctoral degree programs are offered in Biology, Chemistry and Environmental Science, Mathematical Sciences, and Physics. A complete list of academic programs and minors offered by the College is given below.

The academic programs:

Undergraduate - Applied Mathematics, Applied Physics, Biology, Chemistry, Environmental Science, History, Communication, Science/Technology/Society.

Masters - Applied Chemistry, Applied Mathematics, Applied Physics, Applied Statistics, Biology, Environmental Policy Studies, Environmental Science (joint with Rutgers), History (joint with Rutgers), Materials Science and Engineering, Professional/Technical Communication, Public Health (joint with Rutgers and UMDNJ).

Doctoral - Applied Physics, Biology (joint with Rutgers), Chemistry, Materials Science and Engineering, Mathematical Sciences (joint with Rutgers), Environmental Science (joint with Rutgers, Material Science and Engineering.

The minors: Applied Mathematics, Applied Physics, Applied Statistics, Chemistry, Drama/Theatre, Economics, Global Studies, History, Legal Studies, Literature, Philosophy/Applied Ethics, Physics, Professional Communication, Science/Technology/Society, Technology/Gender/Diversity.

From 1999-2003, CSLA awarded 586 degrees: 230 Bachelor's degrees, 283 Master's degrees, and 73 doctorates. In Fall 2003, CSLA awarded 47 Bachelor's degrees, 53 Master's degrees and 16 doctorates. This constitutes 6.8% of all degrees awarded at NJIT in Fall 2003. In Fall 2003, CSLA enrolled 545 majors at all levels (6.2% of NJIT students), and our students earned approximately 11,184 credit hours (6.4% of the NJIT total). In addition, CSLA faculty taught a total of 10,133 students in GUR courses in Fall 2003-Spring 2004.

CSLA currently has 100 tenure-track faculty (nearly one third of NJIT's total). The College also has 35 special lecturers (out of NJIT's total of 80), and a full-time staff of 27 (approximately 3% of NJIT's total full-time staff).

CSLA faculty are actively involved in research. The College's notable research specialties include: in Mathematical Sciences/Biological Sciences - mathematical biology, fluid dynamics, wave propagation, combustion, statistics, applied analysis, molecular modeling and drug discovery, computational neuroscience. In Physics – solar and terrestrial physics, optical science, laser, condensed matter, microelectronics. In Chemistry and Environmental Science - kinetics, thermochemistry, atmospheric/plasma/analytical chemistry, sensor assemblies, nanotubes, fuel cells, green liquids, bio-catalysis, computational drug interactions, supercritical fluids, particle coating, water quality economics, watershed management, coastal ecosystem, industrial

ecology, environmental policy. In Humanities - technical communication and writing, professional ethics, environmental philosophy. In History - history of technology, environment, medicine and communication. In 2004 FY, CSLA research expenditures were approximately $7.2 million.

CSLA has developed close relationships with industry. The departments in the College have active industrial advisory boards that include members of large and small companies representing a wide range of high technology industries. The College also maintains its own industrial advisory board, which is now being revamped and expanded to meet the evolving needs of academic and research initiatives of CSLA.

Development of CSLA Identity and Image

CSLA is a relatively new college that has yet to develop a coherent overall image of its structure, mission and strategic agenda for teaching and research. It is essential that such an all-encompassing vision be formulated in order to achieve the necessary mission focus and programmatic coherence on which to base our short and long range strategic plans. The development of a CSLA identity is the first step in being able to increase its visibility. This will require strong leadership and a commitment on the part of the faculty, administration and staff of the College to crafting an identity and mission that can then be promoted, articulated and disseminated in ways that will enhance the visibility of CSLA.

CSLA has the primary responsibility for providing GUR courses and instruction, and has a history of commitment and outstanding teaching in the GUR as well as upper level courses. In addition to maintaining the excellence and timeliness of the GUR offerings, we need to find more effective ways of conveying the important role that CSLA plays in this fundamental aspect of all programs to the rest of the NJIT community, and engaging the community in the GUR process.

The College has a significant number of outstanding researchers and scholars in biology, chemistry and environmental science/policy, history, humanities, mathematical sciences, and physics. In fact, research and associated expenditures for CSLA for 2003-2004 comprised approximately 20% of the total for NJIT. In addition, the university, as part of its strategic planning, has selected the Department of Mathematical Sciences as one of three areas targeted to achieve national prominence and has identified materials science and engineering as a niche area of excellence that is slated for additional support. Members of the Chemistry and Environmental Science and Physics departments are active participants in this initiative.

As CSLA has significant interest and expertise in the fundamentals of mathematics and the sciences, there should be natural synergies between members of our faculty and researchers in other disciplines – especially in NCE and CCS - thus creating opportunities for CSLA's involvement in important interdisciplinary research. Although there have been several successful research collaborations of this kind, CSLA could increase its visibility by enhancing such interdisciplinary efforts among the departments within the College, other colleges at NJIT, and external researchers in the sciences and arts. An especially attractive possibility in this vein is the use of the expertise of CSLA in the biosciences as a means of creating research collaborations with some of the many high technology biology and medical science based industries in New Jersey and the region, thus further increasing the College's visibility. This will also help strengthen NJIT's role (and self-proclaimed description) as a public research university - both in

terms of perception, meaningful interactions, and collaborations that actually benefit the community.

Identification and Engagement of College Leadership

The College must proactively work to identify and develop its leaders in education and research and find ways of encouraging them to assume more responsibility in both shaping the character and mission of the College in the short run. Furthermore, we must identify and reach out to the next generation of leaders who will help achieve our long range goals. There are many members of the CSLA faculty who are capable of filling vital leadership roles in the immediate and future development of the College. One way of insuring the success of these efforts is to develop an atmosphere of increased faculty involvement in all of the educational and research activities and decision-making processes.

A solid first step in achieving development of the necessary leadership is to have regular meetings among the department chairs and dean, and frequent meetings of the College faculty in which the goals and objectives of CSLA can be crafted and refined in an atmosphere that encourages a free exchange of ideas. In essence, we need to take steps to eliminate any barriers between the administration and the faculty in ways that underscore the absolutely fundamental realization that the success of CSLA is the responsibility of all of its members. By creating an atmosphere of faculty involvement that encourages innovative thinking and an open exchange of ideas while welcoming constructive self-criticism, we should be able to develop an effective system for nurturing the leadership required to achieve excellence, which in turn will translate into a significant enhancement of the visibility of the College.

Department Strategic Planning

It is imperative that the academic departments within CSLA formulate their own detailed short-range goals in research and teaching that take full advantage of the many possible synergies that exist among them. First, we need to get the most out of the human and material resources and facilities that we have, and to carefully set forth our needs for the future in a way that is based on building a coherent structure for the whole College.

There are several areas about which the sciences can cohere, including the biological sciences, and materials science – two areas in which there is enough of a current critical mass to serve as the foundation for excellent, nationally known teaching and research programs. Coordination with the university's strategic plan, with the overall NJIT academic plan, and with the College's strategic plan is absolutely critical to creating well-formulated, synergistic goals within the departmental strategic plans. Not only do we require the best possible planning for immediate needs, we must be flexible enough – and sufficiently well-informed – to adapt to changing national and international trends in scientific research. The departments will draft their own strategic plans that will have to be articulated and fine-tuned among the entire College group, so they can be modified to optimize their overall coherence and effectiveness. This calls for regular meetings among the dean and department chairs. In this way, we can get the most out of our limited material resources by identifying the most efficient avenues for programmatic and research cooperation.

NJIT's mission as a technological university naturally leads to a focus on the sciences, but the liberal arts must also play an integral part in the achievement of our stated goals. To be efficient and to achieve success, in terms of allocation of resources, it is necessary that we carefully identify the areas of focus for strengthening – ideally ones that have natural synergies with other programs in CSLA. Consequently, a necessary first step is to choose those sub-disciplines within the liberal arts that best fit our present faculty, and complement existing programs and envisioned growth areas. A positive move in the direction of enhancing current faculty interactions has already been taken in the form of moving the successful policy sciences group from the Department of Humanities and Social Sciences to the Department of Chemistry and Environmental Science and the reestablishment of the Department of Humanities as a separate unit.

Academics

General Education

A strong general education component for our students is a prerequisite to achieving excellence in education. All our students must receive excellent grounding in English composition, literature, culture, and history, in addition to mastering, for example, calculus and statistics. The successful education of innovators in engineering, science and technology requires the broad training of the intellect at which the humanities excel. The best engineers know the history of their field as well as the history of our civilization. They can write and speak clearly and eloquently about the details of their own work. They appreciate the great ethical and cultural trials of technology. Students' apparent inability to read, write, and articulate can all be best illuminated by serious engagement with the humanities. Thus, interdisciplinary scholarship in humanities whose work engages technology in unusual ways will be beneficial to the education of all NJIT students.

These issues are extremely important for the College since every student at NJIT takes our courses and we serve more students than any of the other academic units of the university. Unfortunately, too often students consider these requirements to be unpleasant hurdles to jump over or crash into, rather than important parts of their education. It is indeed the mission and role of CSLA to put specialized learning in a larger cultural context. We have a responsibility to provide interesting, challenging, deep, and provocative learning experiences at all levels of the curriculum. Not one of our courses should be experienced as a dull requirement, a waste of time, poorly planned or poorly taught.

Undergraduate Education

The departments comprising CSLA are engaged in a process of continuous improvement of their undergraduate curricula. Recruiting an outstanding, diverse undergraduate student body is a high priority. Program offerings in all departments are of high quality and the undergraduate cohort is reasonably diverse (40% female, and 26% underrepresented groups in F'2003) and well qualified (1183 SAT average in F'2003),

but enrollment figures are disappointing (a total of 250 students in F'2003) and need to be significantly increased – by 65 % in the short term and to eventually double.

CSLA departments, with the active participation and coordination of the Dean's Office, will formulate plans to effect major increases in the undergraduate enrollment, while simultaneously maintaining – and possibly enhancing - the diversity of this group, and increasing the number of well-qualified students from underrepresented groups. These plans will include strategies to improve the quality of our undergraduate student body over the next five years. Some of the measures that will be used to achieve these goals are: expanding and enhancing recruitment activities, creating more research opportunities for undergraduates, and making sure that our best teachers are involved in undergraduate education. Other steps include increasing and upgrading facilities and equipment for undergraduates, adding faculty members who excel both in teaching and research, developing new courses in such areas as biochemistry, biophysics and biostatistics, exploring new ways of teaching and delivering courses and programs, and gradually raising admission standards to compete with national programs of instructional excellence.

Graduate Education

The College is also committed to strengthening and increasing graduate enrollment, while increasing the number and diversifying the graduate student population. The number of MS students and PhD students in CSLA is roughly equal to that of the undergraduates (140 MS and 113 PhD). The PhD student enrollment (about 25% of NJIT total) and graduation rate (about 30%) in CSLA is superb. Female and underrepresented groups comprise about 30% of the CSLA graduate student body. Moreover, the retention rate of CSLA graduate students is approximately 80% overall. However, we need to increase the percentage of students who are US citizens and those who come from minority groups, improve the quality of our graduate students, and increase the number MS and PhD students (by 35% over the next five years).

The enrollment at the graduate level can be increased in a number of ways including better student recruitment activities and external outreach. In particular, we plan to strengthen our relationship with NJ state colleges by formulating BS/MS articulation agreements in areas that do not compete with the state colleges. Also, new program options that will create a more attractive and timely variety of graduate specializations in the CSLA will be added. Departmental plans include developing specialties in biophysics, biochemistry and pharmaceutical chemistry, expanding and strengthening the Professional and Technical Communication program to cover design and usability, expanding offerings in biostatistics as well as expanding our efforts in computational biology by returning the MS program to CSLA once the College of Computing Sciences creates its new program in Bioinformatics.

New Directions and Student Diversity

CSLA will engage in a college-wide effort to identify promising new directions that are consistent with the mission of NJIT and make use of the expertise among the departmental faculties. Although our undergraduate and graduate programs are strong, they could certainly be further improved and made more attractive to students. We need to explore new directions in order to increase the quality and quantity of our undergraduate and graduate students. The College will explore new directions in undergraduate education and new inter/multi-disciplinary options including the development of pre-medical/pre-dental/pre-law options in all our majors, and the creation of a teachers' education program (in chemistry, biology, English, history, mathematics, physics, science/technology/society, etc.), in collaboration with Rutgers-Newark. Recruitment efforts will be directed at attracting more domestic, women and minority students to all our programs – but especially to our graduate programs.

Research

In addition to providing strong academic programs, it is essential for CSLA to achieve national prominence by enhancing its reputation for outstanding, cutting-edge research. This is the essence of our focus on expanding research accomplishments. CSLA has already made major strides in research and scholarship over the last five years. Both the quality and quantity of research publications has improved greatly, and research expenditures have now reached nearly seven million dollars. These achievements give testimony to CSLA's efforts to enhance and expand research/scholarship quality and productivity.

Achieving an even better reputation, in harmony with NJIT's Strategic Plan, is a process that has already begun, and it will continue to be a work-in-progress over the next five years. The NJIT Strategic Plan has identified the Department of Mathematical Sciences as a unit that will receive the requisite support to build nationally recognized programs upon the considerable strengths they already have. Also, some of the niche entities selected for support, such as materials science and biomedical engineering, are areas in which CSLA has significant expertise and involvement. With other research initiatives in the departments of physics and chemistry/environmental science, such as our internationally recognized solar physics group at Big Bear, and in our emerging biological sciences presence, the College is well situated and on its way to achieving its research goals.

In order to build upon its successful research platform, CSLA must provide a more stimulating and congenial environment for creative activities and an effective infrastructure to support its research initiatives. Improvements in these areas are required to provide the necessary elements for attaining a competitive research presence with the best universities in the country.

Current levels of research and scholarly quality, production and funding are much higher than a scant few years ago, but an increase of about 60% in each of these categories will be required over the next five years in order to be competitive with top tier technological universities and to be consistent with the university's strategic plan. A number of initiatives will be implemented in order to strengthen research. These include: increasing interdisciplinary activities among both academic units and high technology industries (consistent with the expertise of our faculty), expanding of faculty hiring in targeted areas to insure an influx of new talent that will improve and consolidate the College's research activities, identifying research areas (such as bioscience, computational science, and materials science) as foci of interdisciplinary research activities and providing the resources necessary to for these efforts to flourish.

Faculty

CSLA boasts a majority of very accomplished faculty members in all of its departments who will serve as a foundation and catalyst for achieving excellence in education and research. The College must continue to increase its efforts to recruit, retain, support, and develop a world-class faculty, with a particular emphasis on recruiting new faculty whose diversity reflects that of the CSLA student population. Although a significant proportion of the CSLA faculty is research-active, this proportion needs to be increased. New faculty must be added in order to achieve critical masses of topnotch researchers and teachers in several key areas of current and possible future strength. More support will be needed to optimize faculty engagement in a full range of activities including research/scholarship, teaching and service, so that CSLA can reach a nationally competitive level.

A hiring plan will be developed to address specific CSLA priorities, with implementation starting in AY 05-06. This plan should immediately elevate the College's academic and research roles at NJIT and visibility in New Jersey and across the nation. The implementation of the hiring plan should take into consideration the limitations of the current economic situation. While such a plan cannot address all long term hiring needs within the College, it should delineate a rational and concrete basis for the growth and visibility of CSLA's departments and programs. The plan should take into consideration our GUR mission, identify areas for CSLA growth, build on NJIT's traditional strengths, and implement the university's strategic plan.

Financial Environment

The College must engage in more focused short- and long- term financial planning and expand development and outreach activities in order to achieve its goals in education and research. Additional sources of funding must be found if we are to succeed. The amount of funds necessary for CSLA to reach its short term and long term goals is likely to outstrip the amounts available from our current sources of support from the state, tuition, and research grants. It is imperative a plan be drafted to devise strategies to help with

meeting our anticipated financial needs, including increased institutional support, and targeted fundraising activities.

Ideally, a development officer must be assigned to CSLA who will work with the Dean and the Chairs on creating opportunities to enhance the financial environment necessary for achieving our goals. Fundraising for new scholarships, fellowships, laboratories, additional sponsored chairs, and space needs will begin in earnest.

Work Environment

An important element in CSLA's quest for excellence is a supportive work environment and infrastructure for faculty and students. Although much has improved over the last decade, CSLA's work environment is still far from where it needs to be in order to be comparable to those of the schools of arts and sciences at the leading universities. Space for students and faculty, which is at a premium, is often adequate at best, and the infrastructure in such areas as sponsored programs does not compare well with that at top tier universities. Moreover, CSLA is understaffed in comparison to the other colleges at NJIT, which creates a strain on faculty and students that detracts from their productivity. More and better space must be made available for faculty and student offices, classrooms, laboratories, and meeting/conference rooms.

Strategic Priorities

We have identified strategic priorities that reflect the diverse scope, interests, responsibilities and aspirations of the College. These priorities can be best formulated in terms of the following three broad areas:

- Achieving Mission Focus and Programmatic Coherence
- Strengthening Academic Quality and Quantity
- Expanding Research Accomplishments

1. Focus and Coherence Priorities

a) Mission Focus

Foster excellence in the GUR and liberal arts as foundational for learning.

Strategies:

- Create modern general education curriculum.
- Ensure CSLA Faculty leadership in GUR.
- Establish assessment and feedback model for GUR.

b) Unifying Themes

Exploit shared interests, emerging themes, resulting synergies.

Strategies:

- Promote emergent bioscience theme (biology, mathematical biology, biostatistics, biophysics, biochemistry, biomaterials).
- Hire faculty with interdisciplinary expertise.
- Build joint/double majors.

2. Academics Priorities

a) Undergraduate Quality and Quantity Priority

Identify/establish viable programs of excellence.

Strategies:

- Target distinctive career-oriented options for expansion (financial mathematics, computational biology, medicinal chemistry, optical science, communication).
- Develop pre-professional programs (pre-medical, pre-law, teacher certification).
- Strengthen: student profile (SAT to 1235), enrollment (+65%), completion rate (to 60%).

b) Expand MS Programs

Develop superior programs in core disciplines and multidisciplinary areas.

Strategies:

- Form partnerships to develop new program options.
- Expand enrollment by 35% (broaden domestic/international base and establish BS/MS articulation with NJ colleges).

c) Expand PhD Program Success

Build on success of current doctoral programs.

Strategies:

- Host scholarly events to increase recognition.
- Create new endowed chairs and student fellowships.
- Increase PhD production by 50%.

3. Research Priorities

a) Strengthen Research

Expand research programs, building on strengths, while promoting collaborations in selected areas.

Strategies:

- Promote collaborations that promise funding/recognition (CSLA, NJIT, Rutgers-Newark, UMDNJ).
- Encourage funding that supports undergraduate/graduate education.
- Increase research funding, externally supported graduate students, and postdocs (60% over 5 years).

Appendix B: Draft Template for NJIT/Rutgers Newark Interactions

Memorandum of Understanding

Rutgers University – Newark
New Jersey Institute of technology

WHERE AS, there is great potential for collaborations between New Jersey Institute of Technology ("NJIT") and Rutgers University – Newark ("Rutgers") in research and teaching; and

WHERE AS, the two universities wish to co-locate specified academic programs for the purpose of strengthening research and training activities; and

WHERE AS, New Jersey Institute of Technology and Rutgers expect to co-locate new and current faculty; and

WHERE AS, keys to recruiting top faculty are excellent research laboratories, a collaborative working environment, and a critical mass of colleagues;

THEREFORE, in consideration of the promises and mutual covenants contained within this Memorandum of Understanding ("Agreement"), the parties hereto agree to the following terms and conditions:

To be added to the appropriate appendix:

Article One: Description of the premises to be occupied.

Rutgers/NJIT premises to be occupied by NJIT/Rutgers

Use of Rutgers/NJIT premises

Parking

NJIT students and faculty shall have no right to park at Rutgers parking areas and driveways and Rutgers students and faculty will have no right to park at NJIT. Students and faculty at the respective institutions will park their vehicles at their home campus or at available pay parking facilities open to the general public.

Renovation Cost Allocation

NJIT will pay and/or reimburse Rutgers, in accordance with fees and charges mutually agreed upon, the costs of renovation of space on the Rutgers campus required to clear and make minor renovations of the faculty and student offices and faculty research laboratories described under Article 1.1 of the appropriate appendix. Rutgers will

provide a written budget and scope of work for the renovations to be accomplished for approval by NJIT prior to commencement of work.

Correspondingly, Rutgers will pay and/or reimburse NJIT, in accordance with fees and charges mutually agreed upon, the costs of renovation of space on the NJIT campus required to clear and make minor renovations of the faculty and student offices and faculty research laboratories described under Article 1.1 of the appropriate appendix. NJIT will provide a written budget and scope of work for the renovations to be accomplished for approval by Rutgers prior to commencement of work.

Payment of animal use fees and space operational fees.

NJIT research faculty will be charged the same fees as Rutgers faculty for purchase and care of research animals at the Rutgers Animal Care Facility. NJIT faculty must have their experimental protocols for use of animal models approved by the Rutgers University Animal Care and Use Committee.

For NJIT programs co-located at Rutgers, NJIT will pay an annual fee to Rutgers for provision of telephone services. There will be no fee for use of office or laboratory space. The annual fee will be as mutually agreed upon at the beginning of each annual period of use.

For Rutgers programs co-located at NJIT, Rutgers will pay an annual fee to Rutgers for provision of telephone services. There will be no fee for use of office or laboratory space. The annual fee will be as mutually agreed upon at the beginning of each annual period of use.

NEED TO RESOLVE ISSUE OF PAYMENT ONE WAY OR ANOTHER

Article Two: Improvements, Repairs and Fire Casualty.

2.1 Ownership

For NJIT programs occupying space on the Rutgers campus all improvements, equipment, fixtures and/or alterations made and/or installed by Rutgers shall be and remain property of Rutgers and may not be removed by NJIT. NJIT may, from time to time, have equipment needed to teach or conduct research installed at its sole expense, subject to prior written approval from Rutgers, which equipment shall remain owned by NJIT. NJIT shall not install any air conditioners, television or radio antennas, interior partitions, make any alterations, additions or changes to Rutgers premises without the prior written consent of Rutgers. NJIT shall maintain Rutgers premises in good order and condition; necessary interior and non-structural repairs required as a result of the negligence of NJIT faculty and/or students will be made by Rutgers and reimbursed by NJIT at a pre-determined/agreed amount. NJIT shall neither encumber nor obstruct any entrances, hallways, stairs, etc., but shall maintain the same in a clean condition, free from debris.

Correspondingly, for Rutgers programs occupying space on the NJIT campus, all improvements, equipment, fixtures and/or alterations made and/or installed by NJIT shall

be and remain property of NJIT and may not be removed by Rutgers. Rutgers may, from time to time, have equipment needed to teach or conduct research installed at its sole expense, subject to prior written approval from NJIT, which equipment shall remain owned by Rutgers. Rutgers shall not install any air conditioners, television or radio antennas, interior partitions, make any alterations, additions or changes to NJIT premises without the prior written consent of NJIT. Rutgers shall maintain NJIT premises in good order and condition; necessary interior and non-structural repairs required as a result of the negligence of Rutgers faculty and/or students will be made by NJIT and reimbursed by Rutgers at a pre-determined/agreed amount. Rutgers shall neither encumber nor obstruct any entrances, hallways, stairs, etc., but shall maintain the same in a clean condition, free from debris.

2.2 Fire and Other Casualty

If the premises occupied by NJIT shall be partially damaged by fire, the elements, building defect or other casualty, Rutgers shall repair the same as speedily as practicable. If, in the sole opinion of Rutgers, the premises were so extensively and substantially damaged as to render them not fit for occupancy, NJIT and Rutgers will explore ways in which this collaborative activity can be continued.

Correspondingly, if the premises occupied by Rutgers shall be partially damaged by fire, the elements, building defect or other casualty, NJIT shall repair the same as speedily as practicable. If, in the sole opinion of NJIT, the premises were so extensively and substantially damaged as to render them not fit for occupancy, NJIT and Rutgers will explore ways in which this collaborative activity can be continued.

Article Three: Compliance with Laws

3.1 Compliance with All Laws

During the term of this agreement, both Rutgers and NJIT shall comply with all laws, ordinance, rules, regulations, requirements and directives of the federal, State and Municipal Governments or Public Authorities and of all their departments, bureaus and subdivisions, applicable to and affecting Rutgers' premises, their use and occupancy, for the correction, prevention and abatement of nuisances, violations or other grievances.

3.2 Non-discrimination

NJIT and Rutgers agree that the universities will occupy and/or use premises under this Agreement without regard to the race, creed, color, national origin, ancestry, age, or sex of any student, employee, volunteer or guest and that the universities will promptly report to the host institution any instance of such discrimination of which it becomes or reasonably should have become aware.

3.3 Warranty Exclusion

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, THERE ARE NO OTHER WARRANTIES REGARDING THE CONDITION OF THE PREMISES, AND ALL OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION, THE

IMPLIED WARRANTIES OF HABITABILITY, MERCHANT ABILITY AND FITNESS FOR PURPOSE, ARE EXCLUDED.

To be added to the appropriate appendix:
Article Four: Term of Agreement/Termination

4.1 Term of Agreement

The term of this agreement shall be three (3) years, starting on the date of execution of this agreement. This agreement shall automatically renew thereafter for additional three (3) year periods unless terminated by either party upon two (2) years written notice.

4.2 Termination

Rutgers may terminate this Agreement at any time for breach of any terms, covenants, or conditions of this Agreement by NJIT. In the event of early termination, NJIT shall vacate Rutgers' premises as soon as reasonably practicable, but in no event later than one year from Rutgers' notice of breach.

Correspondingly, NJIT may terminate this Agreement at any time for breach of any terms, covenants, or conditions of this Agreement by NJIT. In the event of early termination, Rutgers shall vacate NJIT's premises as soon as reasonably practicable, but in no event later than one year from Rutgers' notice of breach.

Article Five: Independent Contractor / No Agency

5.1 Independent Contractor Status

Faculty and students are and shall be treated as independent contractors by the host institution for all purposes related to these agreements. As such, they will continue to be employees and/or students of their home institutions, and shall not be entitled to any right or benefit applicable to employees and/or students of the host institution. Neither party nor any of their respective employees are authorized or empowered to act as agent for the other for any purpose related to these agreements and shall not on behalf of the other enter into any contract, warranty, or representation as to any matter. Neither shall be bound by the acts or conduct of the other.

Article Six: Use of Computer Network: Confidentiality

6.1 Use of Computer Networks

The faculty, staff, and students of NJIT occupying space at Rutgers shall be permitted access to Rutgers' computer network as required for conduct of their research and educational activities. In doing so, NJIT's faculty, students and/or personnel shall comply with all Rutgers data and software security requirements, including but not limited to Rutgers computer virus policy, and shall not without prior written approval from Rutgers: (i) disclose to other individuals any passwords associated with a user identification; (ii) access or attempt to access any data or computer files that the user is not authorized to

access; or (iii) create, read, destroy, erase, or copy computer programs, files or documentation that are not required to perform the research and teaching activities contemplated by this agreement.

Correspondingly, faculty, staff, and students of Rutgers occupying space at NJIT shall be permitted access to NJIT's computer network as required for conduct of their research and educational activities. In doing so, faculty, students and/or personnel shall comply with all NJIT's data and software security requirements, including but not limited to Rutgers computer virus policy, and shall not without prior written approval from Rutgers: (i) disclose to other individuals any passwords associated with a user identification; (ii) access or attempt to access any data or computer files that the user is not authorized to access; or (iii) create, read, destroy, erase, or copy computer programs, files or documentation that are not required to perform the research and teaching activities contemplated by this agreement.

6.2 Non-disclosure of confidential information

To the extent permitted by law, each party shall keep all confidential or proprietary information of the other party in confidence and, except as specifically authorized pursuant to this agreement, shall not publish, disclose or otherwise make available, directly or indirectly, without the prior written consent of the owner, any item of confidential information.

Article Seven: Intellectual Property

7.1 Jointly developed intellectual property ownership

NJIT and Rutgers shall jointly and equally own all right, title and interest in all inventions, designs, discoveries, patents, copyrightable material, computer software, databases, or other intellectual property whatsoever, whether patentable or not the like, conceived or reduced to practice jointly by employees, faculty, and/or students of Rutgers and NJIT under this agreement. Each party agrees to cooperate with the other and to prepare and execute those documents reasonably necessary to carry out the intent of this article. Each party agrees to share equally in all income and royalties and expenses in preparing, filing, prosecuting and/or maintaining patents for joint inventions, which the parties mutually agree to file on or maintain in any country.

7.2 Individually developed intellectual property ownership

All inventions, designs discoveries, patents, copyrightable material, computer software, databases, or other intellectual property whatsoever, whether patentable or not, conceived, created or reduced to practice solely by employees, faculty and/or students of either party, shall be the sole and exclusive property of that party, with no ownership interest in nor royalty due to the other.

7.3 Preexisting Intellectual Property Ownership

Each party shall retain all rights, title and interest in and to all of its intellectual property in existence prior to the effective date of this agreement. Additionally, each party shall

maintain sole ownership of all improvement, modifications or adaptations of its intellectual property in existence prior to the effective date of this agreement.

Article Eight: Indemnification/Liability/insurance

8.1 Indemnification/hold-harmless

Each party agrees to indemnify and hold the other harmless from and against and all loss, cost, damage, claims, demands, and causes of action arising out of the performance of this agreement which are asserted by any person (including, without limitation, Rutgers' and/or NJIT's employees, faculty and/or students), for personal injury, death, or loss of or damage to property resulting from willful or negligent acts or omissions of the indemnitor or its agents. This clause shall survive the termination of this agreement.

8.2 Assumption of Liabilities

NJIT hereby assumes any and all risk of personal injury to its employees, personnel, and students occurring on Rutgers' premises provided for use under this agreement. Rutgers shall not be liable for the loss of or damage to any property of NJIT, its faculty or students or of others by theft or otherwise. NJIT at its own cost and expenses shall obtain an insurance policy to protect its and/or its guests' furnishings and personal items which are stored at the premises. No insurance is or will be provided by Rutgers for the same.

Correspondingly, Rutgers hereby assumes any and all risk of personal injury to its employees, personnel, and students occurring on NJIT's premises provided for use under this agreement. NJIT shall not be liable for the loss of or damage to any property of Rutgers, its faculty or students or of others by theft or otherwise. Rutgers at its own cost and expenses shall obtain an insurance policy to protect its and/or its guests' furnishings and personal items which are stored at the premises. No insurance is or will be provided by NJIT for the same.

8.3 Insurance

NJIT represents and warrants that it has adequate liability insurance, such protection being applicable to officers, employees, agents and students. Rutgers shall be named as an additional insured on all such policies. NJIT waives all rights of recovery against Rutgers and/or its insurers for any loss, damages or injury of any nature whatsoever to property or persons for which NJIT is insured. NJIT Risk Management and Insurance Office will provide the required certificate of Insurance naming Rutgers as additional insured upon execution of this agreement.

Correspondingly, Rutgers represents and warrants that it has adequate liability insurance, such protection being applicable to officers, employees, agents and students. Rutgers shall be named as an additional insured on all such policies. Rutgers waives all rights of recovery against NJIT and/or its insurers for any loss, damages or injury of any nature whatsoever to property or persons for which Rutgers is insured. Rutgers Risk Management Office will provide the required certificate of Insurance naming NJIT as additional insured upon execution of this agreement.

Article Nine: Assignment/Subletting

9.1 No Assignment/Subletting

NJIT shall not, without the written consent of Rutgers, assign, record, mortgage or hypothecate this agreement, nor sublet or sublease the premises or any part thereof.

Rutgers shall not, without the written consent of NJIT, assign, record, mortgage or hypothecate this agreement, nor sublet or sublease the premises or any part thereof.

Article Ten: General Provisions

10.1 Entire Agreement/Waiver

This and the appropriate appendix constitutes the entire agreement of the parties hereto with respect to the subject matter of this agreement which may not be modified, amended or deemed waived, unless done in writing and duly signed by the parties. No failure by either party to enforce any provision of the agreement shall constitute or be constructed as a waiver of any future right to enforce a contractual provision.

10.2 Choice of Law/Forum

The parties agree that the laws of New Jersey, without regard to its choice of law principles, shall govern this agreement, including its validity, interpretation and enforcement.

10.3 Supervision of Agreement

The Dean of the College of Science and Liberal Arts (NJIT) and the Dean of the Faculty of Arts and Sciences - Newark (Rutgers) will supervise this agreement. The deans will review the arrangements annually and make minor operational adjustments that are mutually acceptable and within the scope of this agreement.

IN WITNESS THEREOF, the parties have duly executed and delivered this agreement as of the date set forth below.

Agreed to and Accepted by:

_____	_____
Gene A. Vincenti, Exec Vice Provost, Rutgers-Newark	date
_____	_____
Priscilla P. Nelson, Provost, NJIT	date
_____	_____
Edward Kirby, Dean FAS-N	date
_____	_____
Fadi Deek, Dean CSLA	date

Appendix C: Summary of course distribution by department for Spring 2006

I. Spring 2006 Chemistry Course Distribution

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Res. Prof	Visiting Prof	Inst	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)	3.0	25.0	8.0	16.0	47.0	3.0	3.0	15.0	83.5	3.0	6.0	212.5
		Contact Hours(%)	0.9%	7.8%	2.5%	5.0%	14.7%	0.9%	0.9%	4.7%	26.1%	0.9%	1.9%	66.3%
		Credit Hours (#)	3.0	23.0	5.0	26.0	71.0	3.0	3.0	27.0	110.0	3.0	6.0	280.0
		Credit Hours(%)	0.7%	5.2%	1.1%	5.9%	16.2%	0.7%	0.7%	6.2%	25.1%	0.7%	1.4%	63.8%
		Enrolment	7	137	61	253	629	24	42	192	1201	35	22	2603
	G	Contact Hours (#)	3.0	12.0	3.0	12.0				6.0	8.0		3.0	47.0
		Contact Hours(%)	0.9%	3.7%	0.9%	3.7%				1.9%	2.5%		0.9%	14.7%
		Credit Hours (#)	3.0	12.0	3.0	12.0				6.0	9.0		3.0	48.0
		Credit Hours(%)	0.7%	2.7%	0.7%	2.7%				1.4%	2.1%		0.7%	10.9%
		Enrolment	6	29	7	40				15	28		6	131
Lec.Lab.Studio Contact Hours (#)			6.0	37.0	11.0	28.0	47.0	3.0	3.0	21.0	91.5	3.0	9.0	259.5
Lec.Lab.Studio Contact Hours(%)			1.9%	11.5%	3.4%	8.7%	14.7%	0.9%	0.9%	6.6%	28.5%	0.9%	2.8%	81.0%
Lec.Lab.Studio Credit Hours (#)			6.0	35.0	8.0	38.0	71.0	3.0	3.0	33.0	119.0	3.0	9.0	328.0
Lec.Lab.Studio Credit Hours(%)			1.4%	8.0%	1.8%	8.7%	16.2%	0.7%	0.7%	7.5%	27.1%	0.7%	2.1%	74.7%
Lec.Lab.Studio Enrolment			13	166	68	293	629	24	42	207	1229	35	28	2734
Others	U	Contact Hours (#)		3.0										3.0
		Contact Hours(%)		0.9%										0.9%
		Credit Hours (#)		3.0										3.0
		Credit Hours(%)		0.7%										0.7%
		Enrolment		1										1
	G	Contact Hours (#)	9.0	21.0		19.0		3.0		6.0				58.0
		Contact Hours(%)	2.8%	6.6%		5.9%		0.9%		1.9%				18.1%
		Credit Hours (#)	15.0	39.0		27.0		12.0		15.0				108.0
		Credit Hours(%)	3.4%	8.9%		6.2%		2.7%		3.4%				24.6%
		Enrolment	3	8		23		1		2				37
Others Contact Hours (#)			9.0	24.0		19.0		3.0		6.0				61.0
Others Contact Hours(%)			2.8%	7.5%		5.9%		0.9%		1.9%				19.0%
Others Credit Hours (#)			15.0	42.0		27.0		12.0		15.0				111.0
Others Credit Hours(%)			3.4%	9.6%		6.2%		2.7%		3.4%				25.3%
Others Enrolment			3	9		23		1		2				38
Total Contact Hours (#)			15.0	61.0	11.0	47.0	47.0	6.0	3.0	27.0	91.5	3.0	9.0	320.5
Total Contact Hours(%)			4.7%	19.0%	3.4%	14.7%	14.7%	1.9%	0.9%	8.4%	28.5%	0.9%	2.8%	100.0%
Total Credit Hours (#)			21.0	77.0	8.0	65.0	71.0	15.0	3.0	48.0	119.0	3.0	9.0	439.0
Total Credit Hours(%)			4.8%	17.5%	1.8%	14.8%	16.2%	3.4%	0.7%	10.9%	27.1%	0.7%	2.1%	100.0%
Total Enrolment			16	175	68	316	629	25	42	209	1229	35	28	2772

II. Spring 2006 Physics Course Distribution

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Res Prof	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)		19.0	21.5	39.5	103.5	2.0	39.0	66.0	15.0	305.5
		Contact Hours(%)		4.8%	5.5%	10.1%	26.4%	0.5%	9.9%	16.8%	3.8%	77.8%
		Credit Hours (#)		27.0	19.0	28.0	117.0	3.0	42.0	32.0	9.0	277.0
		Credit Hours(%)		6.7%	4.7%	6.9%	28.8%	0.7%	10.3%	7.9%	2.2%	68.2%
		Enrolment		168	187	280	1168	13	465	587	126	2994
	G	Contact Hours (#)					6.0	15.0				21.0
		Contact Hours(%)					1.5%	3.8%				5.4%
		Credit Hours (#)		3.0			9.0	15.0				27.0
		Credit Hours(%)		0.7%			2.2%	3.7%				6.7%
		Enrolment		1			23	23				47
Lec.Lab.Studio Contact Hours (#)				19.0	21.5	39.5	109.5	17.0	39.0	66.0	15.0	326.5
Lec.Lab.Studio Contact Hours(%)				4.8%	5.5%	10.1%	27.9%	4.3%	9.9%	16.8%	3.8%	83.2%
Lec.Lab.Studio Credit Hours (#)				30.0	19.0	28.0	126.0	18.0	42.0	32.0	9.0	304.0
Lec.Lab.Studio Credit Hours(%)				7.4%	4.7%	6.9%	31.0%	4.4%	10.3%	7.9%	2.2%	74.9%
Lec.Lab.Studio Enrolment				169	187	280	1191	36	465	587	126	3041
Others	U	Contact Hours (#)		3.0								3.0
		Contact Hours(%)		0.8%								0.8%
		Credit Hours (#)		3.0								3.0
		Credit Hours(%)		0.7%								0.7%
		Enrolment		1								1
	G	Contact Hours (#)	9.0	36.0		9.0		3.0	3.0		3.0	63.0
		Contact Hours(%)	2.3%	9.2%		2.3%		0.8%	0.8%		0.8%	16.1%
		Credit Hours (#)	18.0	51.0		21.0		3.0	3.0		3.0	99.0
		Credit Hours(%)	4.4%	12.6%		5.2%		0.7%	0.7%		0.7%	24.4%
		Enrolment	6	35		3		4	1		1	50
Others Contact Hours (#)			9.0	39.0		9.0		3.0	3.0		3.0	66.0
Others Contact Hours(%)			2.3%	9.9%		2.3%		0.8%	0.8%		0.8%	16.8%
Others Credit Hours (#)			18.0	54.0		21.0		3.0	3.0		3.0	102.0
Others Credit Hours(%)			4.4%	13.3%		5.2%		0.7%	0.7%		0.7%	25.1%
Others Enrolment			6	36		3		4	1		1	51
Total Contact Hours (#)			9.0	58.0	21.5	48.5	109.5	20.0	42.0	66.0	18.0	392.5
Total Contact Hours(%)			2.3%	14.8%	5.5%	12.4%	27.9%	5.1%	10.7%	16.8%	4.6%	100.0%
Total Credit Hours (#)			18.0	84.0	19.0	49.0	126.0	21.0	45.0	32.0	12.0	406.0
Total Credit Hours(%)			4.4%	20.7%	4.7%	12.1%	31.0%	5.2%	11.1%	7.9%	3.0%	100.0%
Total Enrolment			6	205	187	283	1191	40	466	587	127	3092

III. Spring 2006 Humanities Course Distribution

Course Type	Level	Data	Prof	Assoc Prof	Asst Prof	Lecturer	Inst	Adjunct	TA	Total
Lec.Lab.Studio	U	Contact Hours (#)	24.0	24.0	15.0	171.0	15.0	42.0	6.0	297.0
		Contact Hours(%)	6.7%	6.7%	4.2%	47.5%	4.2%	11.7%	1.7%	82.5%
		Credit Hours (#)	27.0	24.0	15.0	174.0	15.0	42.0	6.0	303.0
		Credit Hours(%)	7.3%	6.5%	4.1%	47.2%	4.1%	11.4%	1.6%	82.1%
		Enrolment	188	211	94	1269	102	261	48	2173
	G	Contact Hours (#)	6.0	6.0	3.0	6.0	3.0	6.0		30.0
		Contact Hours(%)	1.7%	1.7%	0.8%	1.7%	0.8%	1.7%		8.3%
		Credit Hours (#)	6.0	6.0	3.0	6.0	6.0	6.0		33.0
		Credit Hours(%)	1.6%	1.6%	0.8%	1.6%	1.6%	1.6%		8.9%
		Enrolment	11	28	16	19	19	22		115
Lec.Lab.Studio Contact Hours (#)			30.0	30.0	18.0	177.0	18.0	48.0	6.0	327.0
Lec.Lab.Studio Contact Hours(%)			8.3%	8.3%	5.0%	49.2%	5.0%	13.3%	1.7%	90.8%
Lec.Lab.Studio Credit Hours (#)			33.0	30.0	18.0	180.0	21.0	48.0	6.0	336.0
Lec.Lab.Studio Credit Hours(%)			8.9%	8.1%	4.9%	48.8%	5.7%	13.0%	1.6%	91.1%
Lec.Lab.Studio Enrolment			199	239	110	1288	121	283	48	2288
Others	U	Contact Hours (#)	3.0	18.0						21.0
		Contact Hours(%)	0.8%	5.0%						5.8%
		Credit Hours (#)	3.0	18.0						21.0
		Credit Hours(%)	0.8%	4.9%						5.7%
		Enrolment	1	15						16
	G	Contact Hours (#)	3.0	9.0						12.0
		Contact Hours(%)	0.8%	2.5%						3.3%
		Credit Hours (#)	3.0	9.0						12.0
		Credit Hours(%)	0.8%	2.4%						3.3%
		Enrolment	1	10						11
Others Contact Hours (#)			6.0	27.0						33.0
Others Contact Hours(%)			1.7%	7.5%						9.2%
Others Credit Hours (#)			6.0	27.0						33.0
Others Credit Hours(%)			1.6%	7.3%						8.9%
Others Enrolment			2	25						27
Total Contact Hours (#)			36.0	57.0	18.0	177.0	18.0	48.0	6.0	360.0
Total Contact Hours(%)			10.0%	15.8%	5.0%	49.2%	5.0%	13.3%	1.7%	100.0%
Total Credit Hours (#)			39.0	57.0	18.0	180.0	21.0	48.0	6.0	369.0
Total Credit Hours(%)			10.6%	15.4%	4.9%	48.8%	5.7%	13.0%	1.6%	100.0%
Total Enrolment			201	264	110	1288	121	283	48	2315

IV. Spring 2006 Math Course Distribution

Course Type	Level	Data	Dist Prof	Prof	Assoc Prof	Asst Prof	Lecturer	Adjunct	TA	Unknown	Total
Lec.Lab.Studio	U	Contact Hours (#)		75.0	110.0	78.0	123.0	175.0	2.0	18.0	581.0
		Contact Hours(%)		10.7%	15.6%	11.1%	17.5%	24.9%	0.3%	2.6%	82.6%
		Credit Hours (#)		75.0	110.0	78.0	123.0	175.0	2.0	18.0	581.0
		Credit Hours(%)		10.2%	15.0%	10.6%	16.8%	23.9%	0.3%	2.5%	79.3%
		Enrolment		613	799	555	971	1166	68	70	4242
	G	Contact Hours (#)	3.0	15.0	21.0	9.0	6.0	6.0			60.0
		Contact Hours(%)	0.4%	2.1%	3.0%	1.3%	0.9%	0.9%			8.5%
		Credit Hours (#)	3.0	15.0	21.0	9.0	6.0	6.0			60.0
		Credit Hours(%)	0.4%	2.0%	2.9%	1.2%	0.8%	0.8%			8.2%
		Enrolment	9	46	114	27	29	43			268
Lec.Lab.Studio Contact Hours (#)			3.0	90.0	131.0	87.0	129.0	181.0	2.0	18.0	641.0
Lec.Lab.Studio Contact Hours(%)			0.4%	12.8%	18.6%	12.4%	18.3%	25.7%	0.3%	2.6%	91.2%
Lec.Lab.Studio Credit Hours (#)			3.0	90.0	131.0	87.0	129.0	181.0	2.0	18.0	641.0
Lec.Lab.Studio Credit Hours(%)			0.4%	12.3%	17.9%	11.9%	17.6%	24.7%	0.3%	2.5%	87.4%
Lec.Lab.Studio Enrolment			9	659	913	582	1000	1209	68	70	4510
Others	U	Contact Hours (#)		3.0	3.0		1.0				7.0
		Contact Hours(%)		0.4%	0.4%		0.1%				1.0%
		Credit Hours (#)		3.0	3.0		1.0				7.0
		Credit Hours(%)		0.4%	0.4%		0.1%				1.0%
		Enrolment		8	4		21				33
	G	Contact Hours (#)		31.0	15.0	9.0					55.0
		Contact Hours(%)		4.4%	2.1%	1.3%					7.8%
		Credit Hours (#)		49.0	21.0	15.0					85.0
		Credit Hours(%)		6.7%	2.9%	2.0%					11.6%
		Enrolment		29	6	3					38
Others Contact Hours (#)				34.0	18.0	9.0	1.0				62.0
Others Contact Hours(%)				4.8%	2.6%	1.3%	0.1%				8.8%
Others Credit Hours (#)				52.0	24.0	15.0	1.0				92.0
Others Credit Hours(%)				7.1%	3.3%	2.0%	0.1%				12.6%
Others Enrolment				37	10	3	21				71
Total Contact Hours (#)			3.0	124.0	149.0	96.0	130.0	181.0	2.0	18.0	703.0
Total Contact Hours(%)			0.4%	17.6%	21.2%	13.7%	18.5%	25.7%	0.3%	2.6%	100.0%
Total Credit Hours (#)			3.0	142.0	155.0	102.0	130.0	181.0	2.0	18.0	733.0
Total Credit Hours(%)			0.4%	19.4%	21.1%	13.9%	17.7%	24.7%	0.3%	2.5%	100.0%
Total Enrolment			9	696	923	585	1021	1209	68	70	4581

V. Spring 2006 History Course Distribution

Course Type	Level	Data	Prof	Assoc Prof	Asst Prof	Lecturer	Adjunct	Total
Lec.Lab.Studio	U	Contact Hours (#)	21.0	3.0	18.0	12.0	15.0	69.0
		Contact Hours(%)	30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
		Credit Hours (#)	21.0	3.0	18.0	12.0	15.0	69.0
		Credit Hours(%)	30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
		Enrolment	168	30	174	117	145	634
Lec.Lab.Studio Contact Hours (#)			21.0	3.0	18.0	12.0	15.0	69.0
Lec.Lab.Studio Contact Hours(%)			30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
Lec.Lab.Studio Credit Hours (#)			21.0	3.0	18.0	12.0	15.0	69.0
Lec.Lab.Studio Credit Hours(%)			30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
Lec.Lab.Studio Enrolment			168	30	174	117	145	634
Total Contact Hours (#)			21.0	3.0	18.0	12.0	15.0	69.0
Total Contact Hours(%)			30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
Total Credit Hours (#)			21.0	3.0	18.0	12.0	15.0	69.0
Total Credit Hours(%)			30.4%	4.3%	26.1%	17.4%	21.7%	100.0%
Total Enrolment			168	30	174	117	145	634