

The Independent Sector

Highlighting New York's 100+ private, not-for-profit colleges and universities and their cultural, economic, and social contributions.



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Inside:
Preparing for an ever
changing world. How
independent campuses
in New York benefit us all.



Commission on Independent Colleges and Universities

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New York's 100+ Private Colleges and Universities

- | | | | |
|------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------|
| Adelphi University | Dowling College | Metropolitan College of New York | Siena College |
| Albany College of Pharmacy | Elmira College | Molloy College | Skidmore College |
| Albany Law School | Excelsior College | Mount Saint Mary College | St. Bonaventure University |
| Albany Medical College | Fordham University | Nazareth College of Rochester | St. Elizabeth College of Nursing |
| Alfred University | Hamilton College | The New School | St. Francis College |
| American Academy
McAllister Institute | Hartwick College | New York Chiropractic College | St. John Fisher College |
| Bank Street College of Education | Helene Fuld College of Nursing | New York College of Podiatric Medicine | St. John's University |
| Bard College | Hilbert College | New York Institute of Technology | St. Joseph's College |
| Barnard College | Hobart and William Smith Colleges | New York Medical College | St. Joseph's College of Nursing at St. Joseph's Hospital Health Center |
| Boricua College | Hofstra University | New York School of Interior Design | St. Lawrence University |
| Bramson ORT College | Houghton College | New York University | St. Thomas Aquinas College |
| Brooklyn Law School | Institute of Design and Construction | Niagara University | Syracuse University |
| Canisius College | Iona College | Nyack College | Teachers College, Columbia University |
| Cazenovia College | Ithaca College | Pace University | Touro College |
| Clarkson University | Jewish Theological Seminary | Paul Smith's College | Trocaire College |
| Cochran School of Nursing | Keuka College | Phillips Beth Israel School of Nursing | Union College |
| Colgate University | The King's College | Polytechnic University | Union Graduate College |
| College of Mount Saint Vincent | Le Moyne College | Pratt Institute | University of Rochester |
| The College of New Rochelle | Long Island College Hospital School of Nursing | Rensselaer Polytechnic Institute | Utica College |
| The College of Saint Rose | Long Island University | Richard Gilder Graduate School at the Museum of Natural History | Vassar College |
| Columbia University | Manhattan College | Roberts Wesleyan College | Vaughn College of Aeronautics and Technology |
| Concordia College | Manhattanville College | Rochester Institute of Technology | Villa Maria College of Buffalo |
| The Cooper Union | Maria College | The Rockefeller University | Wagner College |
| Cornell University | Marist College | The Sage Colleges | Watson School of Biological Sciences at Cold Spring Harbor Laboratory |
| The Culinary Institute of America | Marymount Manhattan College | Samaritan Hospital School of Nursing | Webb Institute |
| D'Youville College | Medaille College | Sarah Lawrence College | Wells College |
| Daemen College | Memorial Hospital School of Nursing | | Yeshiva University |
| Dominican College | Mercy College | | |
| Dorothea Hopfer School of Nursing | | | |

The Independent Sector

Highlighting New York's 100+ private, not-for-profit colleges and universities and their cultural, economic, and social contributions.

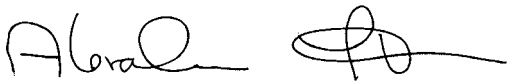
Independent Higher Education: Source of Solutions to New York's Most Pressing Problems

Higher education is New York's engine for the "knowledge economy," and the Independent Sector stands ready to develop the human capital needed for future economic competitiveness, ready to educate the individuals who will learn to think critically and to offer solutions to the broader problems facing New York and the nation.

A multitude of benefits, in fact, flow from New York's institutions of higher education into nearly every aspect of life in our state—from improved health care and national security to technological innovations and greater civic engagement. College graduates volunteer more, vote more often, and participate more in the community. A college education is also the most effective way of transcending distinctions—of race, ancestry, or wealth—that can fragment our society. The diverse body of 460,000 students now enrolled in the private sector of higher education in New York will be an enlightened citizenry that will help to reinforce the very foundation of a democratic society.

This issue of *The Independent Sector* highlights some of these greater social benefits provided by our independent colleges and universities. "Emergency Readiness Now" shows just how critical the innovative, caring foresight of our colleges and universities is to public safety. "Vaccine Victories" tells of the lives saved or improved by New York's premier academic research institutions. "Climate Change" details the solutions underway by the scientific minds in our universities to reverse the threat to our planet's health.

In the end, the value to society from higher education cannot be fully estimated by standard rate-of-return projections. Its full value lies in being a source of broad, effective, and powerful solutions for a future at once promising and uncertain.



Abraham M. Lackman
President, Commission on Independent
Colleges and Universities



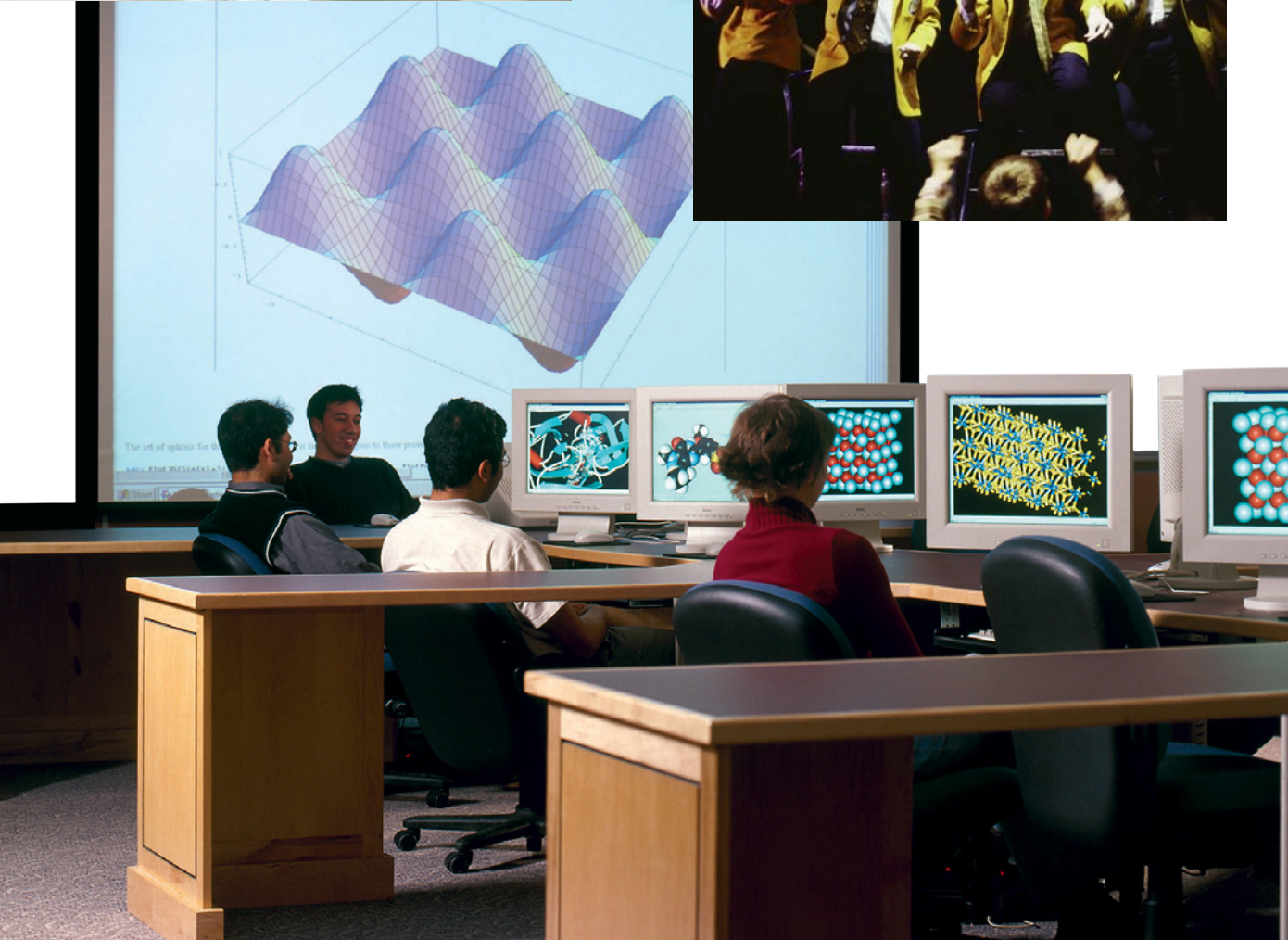
Commission on Independent Colleges and Universities
Solutions for New York's Future:
100+ Independent Colleges and Universities

For more information about the Independent Sector of higher education in New York State, visit www.cicu.org and www.nycolleges.org.

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Teaching & Learning in the Neomillennium

From robotics to mobile wireless devices, new technologies are changing the way college and university faculty educate students.

As we step into this dawning century, educators and students are embracing new methods of computer-aided learning. The age of one-size-fits-all courses of fixed length, content, and function or method of teaching is over. With it, claim educators, arrive courses that better engage students and place them at the center of learning. This is due in large part to interactive technology and the ability to access information, and resources distributed across distance and time. The success of any technology, however, lies ultimately on how well it is put to use.

The challenges for higher education in a rapidly changing digital arena are many. Finding and implementing software compatible to a particular college platform is both difficult and costly. Universities often try hundreds of

methods to facilitate “blended” courses – courses that use combinations of virtual and physical resources. Even technologies that have been around awhile, such as adaptive learning techniques (ALT), take commitment and know-how in order to develop meaningful course materials that make use of them.

For Dr. Allen Burdowski of **St. Francis College**, “the technology is meaningless unless you really make the decision to jump in feet first and take advantage of all the possibilities.” The result is well worth it. Students gain tremendously from the individualized learning that ALT offers by matching learning activities to learning styles. Interactive tools in the classroom, such as blogs and wikis, expand learning opportunities and engage students.

To help faculty think through the deeper educational impact of the revolutionary communications technologies, **Hofstra University** developed a week-long boot camp. **Manhattan College** uses Jasper Educational Technology, a training and support resource, to provide one-on-one support to faculty integrating new technology in their classrooms and labs.

Often, once a college adopts a technology, the way in which it is used expands beyond initial expectations. At **Mercy College** students can now obtain credit for “life achievement.” Students are allowed to earn up to 30 credits based on learning outside the classroom through “i-web folio.” This Web-based program provides students with an academic portfolio geared toward career planning. **Mount Saint Mary College** uses Blackboard to provide students and faculty convenience and flexibility. Faculty can post classes and students can “attend” them whenever they want. **When Daemen College adopted Blackboard online classroom technology in 2000, the College’s reach blossomed among working professionals who access their Daemen classes from home or office. “During the last academic year, Daemen’s connectivity has expanded four and a half times,” said Anthony J. Klejna, director of educational technology.**

I Pod, You Pod

Students’ iPods and other portable media devices are not just for downloading music and movies anymore. They can



hold lectures by professors who choose to podcast their classes. Even PowerPoint slides, Web pages, and annotations on a SMART Board, large whiteboards that allow students and teachers to interact via computer-based materials, can be recorded to narration for podcasting. Students access the content through Apple’s free service, iTunes, or through a college’s Blackboard Learning System or other Virtual Learning Environment (VLE).

Professors at **College of Mount Saint Vincent** are developing recordings to supplement class discussion and to provide audio resources for test preparation. Commuter students fully appreciate the podcasts for in-transit listening, as do hearing-impaired students who use the recordings to ensure accurate and complete notes. And for the 25 percent of the **Excelsior College** student body in the military and deployed around the world, accessing course content through portable media players, such as iPods, is a special boon.

This academic year, **Manhattan College**, as well as **Polytechnic University**, both launched Apple’s iPod University to support streaming audio and visual content. **Rochester Institute of Technology** also started podcasting the graduate class “Applied Multivariate Statistics.”

PDA’s (personal digital assistants), like MP3 players, allow students to play podcast audio recordings of lectures. PDA’s help prepare **Adelphi University’s** nursing students for a healthcare system that is increasingly becoming paperless. The PDA’s allow students to look up medications, obtain information about diseases, access laboratory data, and even calculate drug dosages and review legal issues.

Medical students at **New York Institute of Technology’s** College of Osteopathic Medicine not only use digital streaming video of all lectures, they now have the same information systems as physicians and maintain a complete record of all their patients through EMR (electronic medical records). The College is the first medical school in the world to deploy EMRs in the classroom.

“Our project is leveraging the collective intelligence of the students, combining cutting-edge, task-based approaches to teaching and learning with an approach to podcasting sometimes known as social podcasting or group podcasting.”

Kevin Gaugler, associate professor of Spanish and assistant dean of the School of Liberal Arts at Marist College.

At least two independent colleges in the state are considered “pioneering podcasters” for their creative uses of the interactive technology. **Marist College** was named one of 16 “Campus Technology Innovators” nationwide for a pilot program known as “Identity Quest: Culture, Community, and Language.” In the program, students generate and share their own content rather than download pre-recorded lectures by professors. On their study abroad programs, students interviewed teachers, neighbors, and other citizens in their host countries, using a set of prepared questions on topics such as art, food, entertainment, and politics. These interviews were then edited and prepared as professional public radio-style recordings. The online environment

also supported the interactions between faculty and students and among students themselves via use of online discussion forums, email, and chat.

In another innovative use of podcasting, **Marymount Manhattan College** students created audio tours for MoMA (Museum of Modern Art) that offered commentary decidedly livelier than the museum's official audio guides. The results wound up on the front page of *The New York Times*. While the project's ample recognition thrilled the students, former professor of communication David Gilbert's objective was to "teach his students to stop being passive information consumers."

Hybrid Classrooms

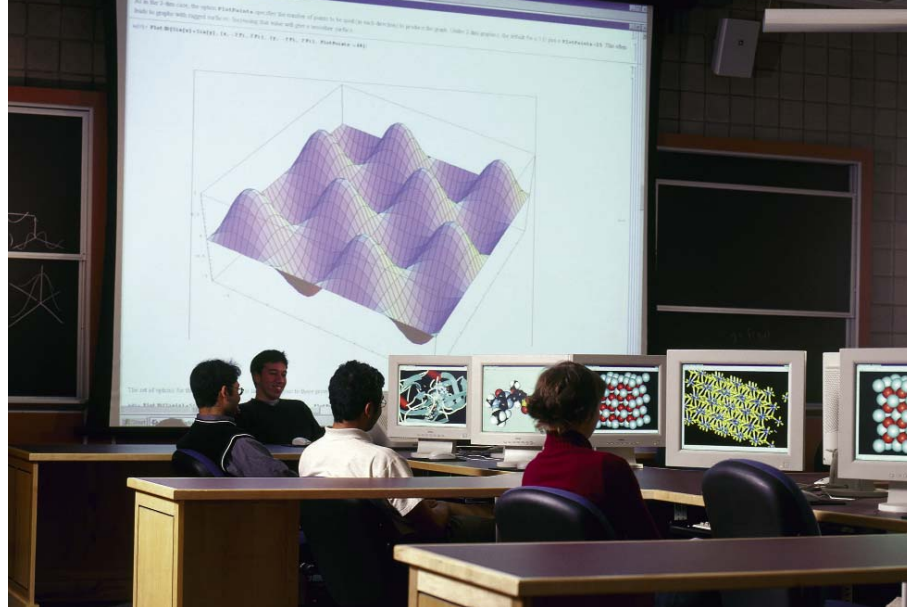
For educators and students alike, the best of both worlds can be found in classrooms with both traditional and high-tech features that allow for a wide breadth of instructional opportunities. In these "smart" classrooms, also called "hybrid" or "blended" classrooms or courses, teachers have instant access to a vast array of electronic resources.

"We can dissect an earthworm or peel back the layers of the human body without ever using a scalpel. It's all right there on the SMART Board."

Dr. Allen Burdowski, St. Francis College

At **Adelphi University**, more than half of the classrooms are hybrid classrooms. The University was a pioneer in the Long Island region creating an affordable and simple to use multimedia system that has attracted the attention of hospitals and other higher education institutions. Faculty members are able to connect their laptops for PowerPoint presentations, access the Internet, play DVDs, and enjoy full IT support and training.

With SMART Board, **New York Institute of Technology** allows students the opportunity to participate in lessons in a way that chalkboards and overhead



projectors never allowed. Teachers can display Web sites, create their own visuals for customized answers to student questions, and even change class notes into text and print them out for students.

At **Hofstra University** faculty can also augment lectures in large classrooms using Internet2-enabled videoconferencing and podcasts.

Students in science labs at **St. Francis College** can dissect an earthworm or peel back the layers of the human body without ever using a scalpel, thanks to their SMART Board. "Smart classrooms" at **Iona College** also use the interactive white boards containing PC projection systems to energize lessons and engage students. And in Iona's chemistry labs, students can view microscopic chemical reactions projected from a microscope with a digital camera and PC interface.

Among the "smart classrooms" at **The College of Saint Rose** are document cameras that allow faculty to display objects and materials through the projector onto a large screen. Anything from frog dissections to circuit boards can be viewed easily by students in these classrooms. Saint Rose's "smart" classrooms also contain interactive LCD monitors that allow faculty to annotate and mark up any displayed materials. Most classrooms at **Manhattan College** have ceiling mounted data projectors and wireless connectivity.

Vassar College's Kenyon Hall opened last fall with six highly wired "smart" classrooms. To make all the sophisticated technology as easy to use as possible, each room features a touch-screen control system for all functions, including audio, video, lighting, and room darkening. Key to Vassar's design is its unobtrusiveness—their "smart" classrooms look and feel like traditional classrooms. Also entirely new, **The College of New Rochelle** has broken ground on a Wellness Center that will incorporate technology-enhanced classrooms.

"Click" to Attention

Clickers first made their appearance in 1998 to increase student interaction in large lecture-hall environments. Today, clickers enjoy across-the-board

success in helping students of all class sizes master content in a fun and easy-to-use format. Like all good technology, clickers are simple, resembling pared-down TV remote control units. In a clicker-use classroom, the teacher may ask students to answer a multiple-choice question designed to determine how well they understand a concept. Each student uses his or her clicker to select a response. Immediately, a running tally of student responses is projected on a screen.

This allows for a rich variety of "teachable moments" in which confusions can be clarified, correct responses validated, debates or discussions launched, and areas that need improvement or further study can be identified. Clickers turn a passive lecture into an interactive exchange that overcomes class size and human dynamics.

At the **University of Rochester**, personal wireless devices called gadgets give professors instant feedback on how they are reaching the students. "If I ask a question of the entire class and discover that most of the class is misunderstanding my subject," says Steven L. Manly, professor of physics and astronomy, "I know immediately that I have to pause and rework the topic." Sometimes Manly will ask the students to hold a quick conversation with fellow students, thereby increasing interaction as well as understanding. Professors at the University even take attendance and issue quizzes with the gadgets.

At **Rochester Institute of Technology**, clickers are used confidentially in order to encourage broader participation. The same is true at **St. Lawrence University** where Professor Patti Frazer Lock wrote the supplement for the Personal Response System for top-selling math texts. "One of my favorite parts about the program is the anonymity," enthuses Lock who feels that the benefits of the system are infinite, even increasing student-to-student interaction through opinion prompts. "The bright students love it, and the quiet, less-engaged students like it because it allows them to let me know if they do or don't understand without raising their hands."

Glossary for the Neomillennium

Blackboard: Software used by educational institutions to manage e-learning, transaction processing, and e-commerce.

Blended Learning: A combination of approaches to teaching, often accomplished through the use of both virtual and physical resources.

Blog: A Web site where entries are made in a journal style and displayed in reverse chronological order.

Breeze: Online collaboration and presentation product.

Clickers: A hand-held device, similar to a TV remote control, which uses infrared or radio frequency technology to transmit and record student responses to questions. Also known as a remote Personal Response System.

Hybrid Classrooms: A course or classroom that uses online learning and wireless technology blended with traditional pedagogical materials.

Internet2: A nonprofit consortium of U.S. universities working to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet.

iTunes U: Hosted by Apple's iPod University, iTunes U is a free service for colleges and universities that provides easy access to educational content on the Internet, such as lectures and interviews.

M-Learning: Education that is distributed to mobile devices, such as cell phones, portable media devices, or PDAs (Personal Digital Assistants).

Moodle: Open-source software designed to help educators create quality online courses.

Open-Source Software: Software whose source code evolves through community cooperation, enabling anyone to copy, modify and redistribute the source code without paying royalties or fees.

Podcast: A multimedia file distributed over the Internet for playback on mobile devices, PDAs or personal computers.

SMART Boards: Large, interactive white boards containing a PC interface to run any chosen pedagogical hardware and software.

VLE: A Virtual Learning Environment (also known as Managed Learning Environment) is a software system designed to facilitate online management of educational courses for students.

WebCT: A course management system offered by Blackboard.

Wiki: A collaborative article that is updated with new and improved information submitted and published by the audience, not just by an author or authors.

Parlez-Vous SANAKO?

Students at the **The Culinary Institute of America** (CIA) interact in a foreign language on a whole new level, thanks to state-of-the-art software called SANAKO Study 1200. The CIA's new language labs incorporate Internet and computer resources to speed up and enhance skills in Spanish, French, or Italian.

Emergency Readiness Now

Colleges and universities take the initiative to be prepared for an emergency — creating programs, running drills, and involving the community.

New York State does not take emergency preparedness lightly. Already a terrorist target, the Empire State also knows its risks for floods, fires, power outages, and severe weather conditions of all flavors. In this volatile environment, it is not enough to have emergency procedures in place, say campus leaders; our plans must be reviewed and reevaluated regularly. Many in the Independent Sector take their role as fore thinkers to new levels, reaching out to the broader community with innovative methods for ensuring public safety.

To help New York and states across the nation design an effective response to large-scale bioterrorism attacks, Weill Medical College of **Cornell University** has pioneered the use of a computer simulation model. Novel and sophisticated, the model predicts staffing requirements for antibiotic or vaccine dispensing centers by using a technique called discrete event simulation. The scientists at Cornell's Department of Public Health say the simulation model should help remedy a potential gap in bioterrorism preparedness nationwide.

Firmly in place, the **Canisius College** Crisis Response plan has been recognized by Erie County Emergency Services as one of the best in the county. The College ensures its public safety staff

members are trained not only in standard first aid, but also as Homeland Security Hazardous Material (HazMat) responders.

Dowling College is also taking a lead role in training first responders as well as local business and community officials in emergency preparedness and management. In a proactive measure, Dowling hosted the conference "Long Island Hurricane Preparedness: Federal-Local Coordination Before Catastrophe Strikes."

Metropolitan College of New York also reaches out to others to help refine its community disaster plan. Partnering with the Village of Amityville on Long Island, a group of graduate students from the College's degree program in emergency and disaster management have already completed a vulnerability analysis of potential hazards. "It's a wonderful idea that will help the Village at no cost to taxpayers," says Mayor Peter T. Imbert.

Close relationships with neighborhood groups are key to successful security on the urban campus of **The College of Saint Rose**. The College opened a satellite security office on the perimeter of the campus called the Neighborhood Security Center that is open to any member of the community and provides support in times of emergency.



Also scheduled to be open to the wider community, **Long Island University's** soon-to-be Harriet Rothkopf Heilbrunn Academic Nursing Center will offer general disaster preparedness seminars to anyone who is interested. The University's School of Nursing also holds a yearly Disaster Preparedness Symposium at its Brooklyn Campus, targeting healthcare workers' need to prepare for the worst in their communities.

Houghton College brought together key leaders from city and county government with representatives from disaster relief agencies in an Emergency Preparedness Forum last spring.

Niagara University was the site for a two-day Bi-National Emergency Preparedness Conference, which drew together experts from New York and Canada, as well as from Florida and New Orleans.

Pace University has hosted numerous conferences, including "Aftershock 2006," examining the economic, cultural, environmental, educational, and political consequences of the World Trade Center terrorist attacks. Pace's Vice President, Frank McDonald, who oversees campus safety and security has also tried to prepare other communities and states for emergencies with a comprehensive presentation he gives, "Lessons Learned."

Getting the word out about disaster training and planning was the goal of a "Bi-County Shelter Plan" organized by C.W. Post Campus of **Long Island University**. A mock shelter was set up on campus to encourage neighborhood organizations, such as churches and civic groups, to train and plan for a wide range of possible disasters.

To set its comprehensive "Pandemic Response" plan in place, **Manhattan College** appointed its first director of risk management, a skilled 26-year veteran of the New York City Department of Corrections. From staff training in infection control measures to campus signage, Robert DeRosa and his office of risk management are reaching out to all areas of the Manhattan College community to ensure safety.

Adelphi University has also created a full-time emergency management position, attracting an expert with more than 30 years of experience from dealing with hazardous materials incidents to developing curriculum about rescue tactics. Richard Rotanz will enhance Adelphi's strong reputation as a community resource for all types of disasters.

The Skidmore College campus became the site of a simulated nerve gas attack last year with student actors playing either the role of terrorists releasing nerve gas or casualties. The drill helped train rescue workers from different agencies to work together and tested college, state, and local emergency response plans.

Beyond Fire Drills

Full-scale emergency drills are the logical progression of comprehensive planning. Called "functional exercises" or "scenarios," these drills are no small accomplishment. The simulations ask student actors, university departments, and outside emergency responders from



ambulance corps to bomb squads to stage day-long crisis scenarios.

The **Skidmore College** campus became the site of a simulated nerve gas attack last year with student actors playing either the role of terrorists releasing nerve gas or casualties. The drill helped train rescue workers from different agencies to work together and tested the College's and state and local emergency response plans.

Keuka College tested its Emergency Clinic Plan by holding a medication dispensing drill to respond to "any kind of epidemic or pandemic" that might affect the campus community. At the C.W. Post Campus of **Long Island University**, students, staff, and local emergency responders took part in a disaster drill simulating a release of toxic fumes. More than 1,600 students and staff were affected by the drill, which Dianna Pennetti, Director of the University's Department of Public Safety, said "gave us an excellent opportunity to refine our disaster planning and emergency response procedures."

Syracuse University holds such drills annually, covering scenarios as diverse as mass contamination, major traffic accidents, and bomb scares. At **Long Island University's** Brooklyn Campus, students, faculty members, and local healthcare professionals participate in fast-paced drills that help them prepare for radiological disasters for example, or dirty bomb scenarios.

Student EMTs: Trained and Ready

Pull a victim from a car accident in the morning; attend calculus class in the afternoon; resuscitate a man at a basketball game in the evening. Student

Some campuses have dedicated emergency phone numbers that result in faster on-scene response times than a call to 911. At the **University of Rochester**, a call to x13 will prompt a visit from at least one of the 160 members of the **University's Medical Emergency Response Team (MERT)**.

EMTs are faced with heart-thumping tests both inside the classroom and out. And they wouldn't have it any other way. To be sure, few extracurricular activities are as intense and rewarding as working with a volunteer fire and rescue corps. The number of student volunteers assisting fire and rescue departments has blossomed in the last decade. Some say the events of September 11, 2001 prompted an increase in service. Others note the skill-building aspects of membership as well as the camaraderie and friendship. Still others stress the importance of having a student-run group that can respond quickly on campus and offer help on a more personal level. Whatever their reasons, nearly all student EMTs cherish the opportunity to make a difference in their communities.

With more than 60 student volunteers, **Syracuse University** Ambulance (SUA) celebrates its 34th year of service to the campus community this year. Each student member is a professionally trained EMT, dispatcher, or driver prepared to deal with just about any situation. The SUA responds to more than 1,500 emergencies a year, while maintaining a level of quality that earned it the New York State EMS Council's EMS Agency of the Year Award in 2004.



With 25 years of service under its equipment belt, the RIT Student Ambulance Corps is one of New York State's leading collegiate EMS teams. Entirely run and staffed by **Rochester Institute of Technology** students, the Corps responds to more than 500 calls annually on campus alone. In recent years, RIT Ambulance has secured \$50,000 in government funding for new equipment, including a new first-responder vehicle and critical communications and emergency response tools.

Vassar College Emergency Medical Service is another long-standing corps of trained student EMTs (as well as safety education and support staff) that has provided confidential emergency care for the campus community for more than 20 years.

At **Mount Saint Mary College**, nursing students work directly with the Orange County Health Department to provide emergency health services.

Many campuses have dedicated emergency phone numbers that result in faster on-scene response times than a call to 911. At the **University of Rochester**, a call to x13 will prompt a visit from at least one of the 160 members of the **University's Medical Emergency Response Team (MERT)**. While all members are CPR certified, 30 members of MERT are also EMT certified.

Beyond working as EMT volunteers, students at **Marist College** purchased a defibrillator for the Fairview Fire District, which serves the campus. Students also successfully sought foundation support for the purchase of new technology for the Fire District. Marist students even helped set up the equipment and train District

employees and volunteers in its use.

The lack of a formal campus-based, student-run EMT corps does not stop **St. Lawrence University** students from heeding the call to service. Fully trained and certified, several St. Lawrence students "run" with the local Canton Fire Department, gaining valuable medical and first-responder experience. "The kids are eager and dedicated and make every call they can," said Canton Fire Chief Michael K. Morgan. "It helps the relationship between the college and the community."

Colgate University also has a long history of providing undergraduate volunteer EMTs and firefighters for its local rescue service: the Hamilton Fire Department. Expected to be on call 24/7, students artfully balance academic work with emergency response. A much newer group, the Red Cross Club at **Canisius College** also puts its student members out in the community to assist fire victims. Initiated by the personal mission of student Daniel B. Moar '04, the Canisius College Red Cross Club is now an official student organization that makes up one-third of the agency's Disaster Action Team in the Buffalo region.

A Remembrance

We at clcu and New York's private colleges and universities send our heartfelt condolences and support to the Virginia Tech community following the tragic events of April 16, 2007. This incident sent a ripple of awareness of campus safety issues throughout the higher education community. We see your resilient spirit as a beacon of hope for us all.



The New Market Force: Knowledge Economy PART II

With its striking ability to serve the diverse needs of the modern economy, higher education pilots New York in the world marketplace.

In its most recent issue, *The Independent Sector* confirmed what economic and industry experts have been predicting – that the future of New York’s economic vitality depends on education and knowledge. Colleges and universities have moved to the core of the state’s economic engine—a progression that got its start in the early 1990s with the steep decline of manufacturing and the rise in technological achievements, particularly the Internet.

Significantly, the aggregate economic impact of New York’s independent higher education sector alone is estimated at \$41.4 billion, according to a study by the Center for Governmental Research (CGR), a nonprofit group for objective policy analysis. This impressive figure includes \$21 billion in spending by the campuses and \$20 billion in spin-off spending by college employees and businesses that provide goods and services to the institutions.

Now, the CGR presents even more data that further defines the role of private higher education in our local and state economies. From job creation to visitor spending to capital construction

to technology transfer, the Independent Sector fuels the state’s economy in myriad ways.

Total labor income, including what economists call “spillover” jobs from campus activities, reaches higher than \$15 billion. To place this figure in context, independent higher education makes a larger contribution to the state’s economy than a number of prominent industries such as building construction or telecommunications. Research and development alone at New York’s private colleges and universities stimulates the creation of 10,000 jobs per year in technology businesses.

Add to this the nearly 20,000 jobs in the construction sector generated by the Independent Sector and a clear picture of its diverse economic strength forms.

The construction and renovation of physical facilities at campuses throughout New York is occurring at a rapid pace, and many capital projects now in the planning stages will soon be realized. This capital thrust by the state’s private campuses aims to attract even more promising scholars, professors, and researchers (who, in turn, bring in federal



and private research dollars and well qualified students).

World-class research, as also reported inside the covers of this publication, makes New York a driving force for the new knowledge economy. In fact, the state’s independent institutions are responsible for \$2.1 billion of the \$2.6 billion in research and development conducted by all New York academic institutions in the state. This activity generates a host of payments from licenses, patents, technology transfer, consultations, and royalties.

Independent higher education is also disproportionately responsible for graduate and professional education in New York State, with two-thirds of these students educated by the Independent Sector. Overall, research and graduate education conducted on independent campuses serves the intellectual and technological needs of today’s economy and holds great promise for the state’s future.

Also greatly adding to the state’s economy, discretionary spending by students in New York’s independent colleges and universities is estimated at about \$1.6 billion annually. This substantial figure is derived from the total number of students enrolled in private higher education (nearly 460,000), who each spend about \$3,470 in-state yearly, according to market research firm Harris Interactive.

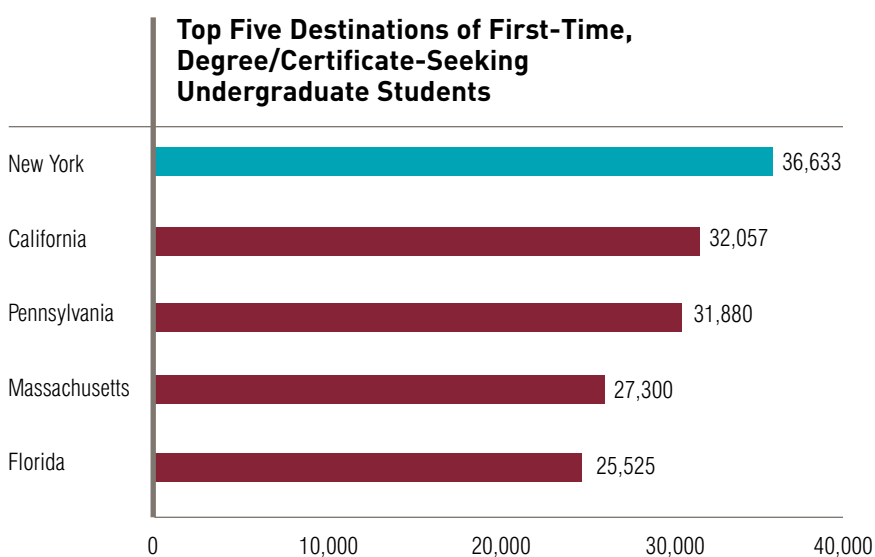
Indeed, few people truly appreciate the sizeable enrollment in New York’s independent colleges and universities – the highest in the nation and world. Larger than populous states such as California and Texas, New York’s Independent Sector comprises 55 percent of total “four-year and above” enrollment in the state. It also attracts the most students from other states. Notably, New York is the top destination for first-time freshmen leaving their home states to seek a college degree. (See chart to the left.)

As a result, visitor spending is not insignificant, particularly in light of the national and international market of students migrating to New York. Simply put, parents and visitors spend when they come. In addition, many campuses are active hosts for conferences, forums, cultural programs, and organized sports.

Another measurable value of New York’s Independent Sector lies in its concentration of top-class academic medical centers. These prestigious institutions perform both routine and sophisticated procedures that attract patients from all over the nation. If only a portion of this clinical care revenue is attributed to the academic mission, \$1.3 billion can be added to direct expenditures associated with the private sector of higher education.

Least measurable in figures, but perhaps most substantial in its effects, is the community service rendered by colleges and universities. This is particularly noted in regions where the university is either the largest employer (as in Rochester) or among the largest employers. Higher education provides public school teachers, cultural enrichment, civic engagement, social service, charitable giving, and free training and support to small businesses.

In all, the steady growth of independent higher education holds the golden key to New York’s future of promise.



Source: National Center for Education Statistics, *Enrollment in Postsecondary Institutions, Fall 2004; Graduation Rates, 1998 & 2001 Cohorts; and Financial Statistics*.
Note: Includes foreign students, those whose residences are unknown, and students enrolled full and part-time. Florida data reported incorrectly was corrected in *The New York Times*.



Read Part I of the “Knowledge Economy” series online. See www.cicu.org, and click “Contributions to Our Communities.” For the complete CGR report, visit “Publications and Reports.”

Climate Change

Higher education is setting the pace in meeting the urgent environmental challenges facing this century.

Global warming, increases in UV radiation, acid rain... the threats to the health of our planet are more imminent than previously thought. Working now to safeguard our world, campuses across New York's Independent Sector understand that averting a catastrophe requires planning that spans centuries and includes others on a global scale. It also requires active scientific minds unbounded by single academic disciplines.

The Global Warming Dilemma

Controversy still surrounds the causes of global climate change on a political, economic, and social level, yet the scientific community has reached a strong consensus. The world is undoubtedly warming, and this change is largely the result of emissions of carbon dioxide and other greenhouse gases from human activities. Indeed, the scenario is alarming: a warming climate gives way to sea-level rise, stressed ecosystems, and a weather pattern as hectic and wayward as kindergarten recess.

One challenge to this theory, a Canadian study published in 2003, attributes increases in global temperatures to long-term natural climate patterns. It was debunked by scientists at **Alfred University** last year. Using a climate reconstruction computer code, Alfred scientists analyzed and evaluated the study. Their results support the findings of earlier research placing the onus of global temperature changes over the last century on human action.

Martin Hoffert, professor emeritus of physics at **New York University**, is a true veteran in the science of climate change. His 1998 paper in *Nature* concludes that we will need between one and three times the carbon-free energy we use now by the year 2050 in order to avoid a series of environmental catastrophes. An optimist nevertheless, Hoffert feels that boosting public funding and technological advances can offer hope. Among his current pursuits for a solution is launching solar power satellites into space where the sun's power is about eight times stronger.

Curt Stager, a natural sciences professor at **Paul Smith's College**, and

his team of undergraduate researchers are studying the effect of climate change on some of the largest and deepest lakes in the world, Lakes Victoria and Tanganyika in Africa. There, they were able to devise a way to predict flooding up to a decade in advance. Closer to home, the professor and his students study the effect of human manipulations on lakes in the Adirondacks.

Lake-effect snow storms on small lakes may be more sensitive to changes in climate, reveal studies conducted by geoscience professor Neil Laird and students at **Hobart and William Smith Colleges**. This sensitivity can result in large variations of the number and strength of localized storms that can produce tremendous snow squalls. Using radar and climate data, the studies seek to understand the influence of changing climate conditions on the development of small-scale weather systems.

Colgate University geography professor Adam Burnett also focuses on the impact of global warming on lake-effect snowfall. Warming lake temperatures widen the gap between lake water and air temperature, explains Burnett, resulting in ideal conditions for snowfall. This may explain the significant jump in snowfall in the Great Lakes region since the 1930s – with no comparable jump in non-Great Lakes areas.

In order to bring new understanding to climate change today, **Vassar College** associate professor Kirsten Menking looks at climate conditions from hundreds of thousands of years ago. Using numerical modeling, Menking's recent work explores the relationship between abrupt climate change and lake levels in New Mexico during the last Glacial Maxium – when parts of Europe, North America, and the Western Siberian Plain were covered with ice sheets.

Closer to home, **Le Moyne College** established the Institute for the Study of Environmental Change to coordinate student and faculty research related to changing global systems. The Institute seeks funding for field-based research projects, promotes solutions to



environmental problems, and develops outreach activities for the public to build environmental awareness in the community.

Students at C.W. Post Campus of **Long Island University** are also tackling the problems of global warming at a local level. The environmental science students created a report calling on leaders in Nassau and Suffolk Counties to agree to specific reductions or limits on greenhouse gas emissions. The report, entitled "A Global Warming Action Plan for Long Island," covered a broad range of ideas – from the use of solar power to the positive environmental impact of vegetarian diets.

Acid Rain

Some of the most acidic rain in the United States falls on the pristine Adirondack region, contaminating lakes, trees, and soils. **Alfred University** and **Colgate University** scientists are investigating the effectiveness of the U.S. Clean Air Act of 1970 and its amendments that were added in 1990. "Are ecosystems recovering?," they ask as they collect data in the Adirondacks. And, if so, "how fast is the recovery occurring?"

Charley Driscoll, one of the country's authorities on acid rain, conducts research at **Syracuse University**. He uses a variety of approaches to investigate the effects of acid rain and mercury contaminations on ecosystems. Although modest gains have been made in the health of lakes due to the Clean Air Act, Driscoll's research indicates that many lakes will not fully recover for decades. In fact, according to one of his studies,

an additional 80 percent reduction in sulfur emissions from electric utilities would be required to bring sensitive waterways back to non-acidic levels within 25 years.

Syracuse University scientists have also invented robots to monitor waters in New York's lakes. The robots use buoys with solar-powered systems and computer-controlled sensors that move vertically through the water to collect near "real-time" data. The data is then transmitted to a Web site through cellular technology, enabling researchers to better understand the dynamics of environmental systems at work.

Confronting the Problem, Reversing the Change

Pursued energetically by the **Rochester Institute of Technology (RIT)** and **Rensselaer Polytechnic Institute (RPI)** among others, fuel cells are seen as a key component of a global energy strategy.

Advanced fuel cell research at RIT crosses scientific disciplines and reaches out to New York manufacturers to form comprehensive collaborations. National Science Foundation grants totaling in the multiple millions help train doctoral students at RIT in fuel-cell science and engineering.

Acknowledging that energy security is the "space race" of this millennium, RPI opened a new \$20 million Center for Future Energy Systems. The Center focuses on renewable energy and energy conservation systems, with an initial emphasis on fuel cells, smart lighting, and other emerging renewable energy systems.

In Tune and Up Tempo on Campus

From a cappella groups to jazz ensembles to gospel choirs, students are swinging to a new surge in music performance.

How far ranging is campus music? From the Hand Bell Choir at Marist College to the Brazilian Music Ensemble at Syracuse University to the bagpipe performances that mark every event at Iona College, a medley of genres draws scores of eager participants – and even larger audiences.

Indeed, music programs, primarily those created from student interest rather than for academic credit, are experiencing a crescendo of popularity. Regardless of major, between 500 and 600 students alone at Rochester Institute of Technology are involved in some way with the College of Liberal Arts music program. At Marist College, 300 non-music majors take part in 18 different ensembles. At Skidmore College, The Dynamics, one of four a cappella groups, have reached the status of rock stars. Living up to their name, The Dynamics regularly fill college auditoriums to capacity, eliciting cheers and shouts equal to those that are heard at championship games.

This zealous growth is fueled by a trio of needs: students who seek a musical outlet bundled with warm camaraderie; professors who understand the character- and confidence-building aspects of membership in a performance group; and community members who appreciate the cultural opportunities offered by their local private colleges and universities.

Campus a Cappella: Beyond Doo Wop

A capella at Vassar College got its start in 1942, when a plague on the campus left all the students in quarantine at night. During this quarantine, 16 young women, who would come to be known as The Night Owls, broke out of their dorms and met secretly in the basement of the library to sing late into the night. The Night Owls, now the nation's oldest continuing all-female a cappella group, have haunted Comedy Central, presidential inaugurations, and a cappella tournaments worldwide over its long and lively history. Likewise, The Colgate Thirteen, a Colgate University men's group, is the third oldest collegiate a cappella group in the country. Chalking up more than 50 performances each semester, Thirteen has entertained presidents and royalty and even belted out the National Anthem at Super Bowl XIII. Another early group, Henry's VIII, named after Wells College founder Henry Wells evolved from a traditional 1940s double quartet to an ensemble of a dozen members with several albums to their credit.

While a cappella grew up around jazz standards and doo wop, its contemporary form is expansive. Fusion, hard rock, Jewish, madrigals, and current pop, each style complete with complex textures



Visit the Web site of your local campus for information about upcoming performances.

and a driving beat, have helped launch a cappella into stardom. In recent years, the number of groups on campuses statewide has quadrupled. Cornell University tops out at a dozen a cappella groups. Vassar boasts no fewer than eight. Rochester Institute of Technology has four.

Many say it's the small, self-directed nature of a cappella that appeals to college students today. A cappella's infectious spirit prompts CD cuts, MP3 downloads, and tight competitions at the annual International Collegiate Championship of A Cappella (ICCA).

In fact, in 2005, three of New York's independent colleges and universities placed in the top four of the ICCA Quarterfinals. Syracuse University's Orange Appeal took first place, University of Rochester's Midnight Ramblers (all-male) landed third, and Marist College's Time Check came in fourth.

New York's private sector also weighs in heavily on the *Best of College A Cappella* CD play list. University of Rochester's Yellowjackets have been chosen twice for inclusion and have also released 14 albums in their 50-year history.

Proceeds from the sale of CDs are often donated to charity – as is the case

with New York Medical College's Arrhythmias. These medical students insert gaiety into their abundant hours of rigorous study through arranging, singing, and recording a cappella tunes. The Arrhythmias perform at children's hospitals and nursing homes and appear annually at the College's Academic Convocation and Commencement.

Rock to Renaissance

Like many Independent Sector colleges and universities, Vassar College showcases a diverse range of musical genres. Its rock trio Genghis Tron, which is known "to blend thrash metal and disco seamlessly," shares the campus with The Renaissance Singers.

"What truly sets Genghis Tron apart from the pack isn't simply the ease and confidence it brings to genres as fundamentally opposed as thrash metal and rubbery disco, but rather the way the band makes you think this stuff all belongs together."

— Decibel Magazine



Vocal Virtuosos

It's nearly impossible to overestimate the quality and reach of student vocal groups within New York's private institutions of higher education. From winning critical acclaim at Carnegie Hall to broadcasting on Radio Vatican in Rome, the **C.W. Post Campus of Long Island University's** Chamber Singers, Madrigal Singers, and Merriweather Consort marked their eighteenth world tour this year. In recent years, **Adelphi University** Chorus has more than doubled its student members to 58. The chorus performs sacred and secular music in free concerts open to the community.

The Laurentian Singers of **St. Lawrence University** celebrated their sixtieth anniversary in 2006 by touring Germany, the Czech Republic, and Poland. The first choral group invited to sing in the Canadian Parliament, the Laurentian Singers pack venues with their wide-ranging repertoire, even singing in Czech and performing rare motets (choral music compositions) and works commissioned specifically for them.

The 24 members of **The College of Saint Rose** Chamber Singers travel regularly to London on a performance tour. **Vassar College** Women's Chorus traveled to Turkey recently, and the College's renowned mixed choir performed at St. Peter's Basilica in Rome.

While the 140 members of the **Marist College** Singers perform regularly at Epcot and Disneyworld, they have also been invited to sing for the canonization of a saint and for the Pope in Rome. The Marist College Singers are among eight singing groups students may choose from. At **Syracuse University**, the Black Celestial Choral Ensemble, Hendricks Chapel Choir, University Singers, Oratorio Society, and Opera Workshop are among a cadre of diverse vocal performance groups.



Similarly, at **Wells College** in Central New York, a singing group exists for nearly all genres – from gospel to Elizabethan madrigals to folk songs. The College's Concert Choir represents a remarkable 10 percent of the resident study body. It handles pieces as diverse as polished a cappella and Christmas literature.

Nyack College's New York City Campus Chorale headed to Puerto Rico last spring on mission trips. The **Houghton College** Choir also glorifies God through its long tradition of performing sacred choral music from Brahms to Buchenberg throughout the United States and Europe.

Gospel is the genre of choice at **The College of New Rochelle (CNR)** where 30 students merge their diverse religious persuasions into an ecumenical singing fest. The CNR Gospel Choir sang at St. Patrick's Cathedral this spring for Black History Month and regularly draws over 200 attendees to public events. **Iona College** also boasts a Gospel Choir, as well as its well-known Arrigoni Choir, which puts an original and enthusiastic spin on traditional worship music.

From Opera to Cabaret: Musical Theatrics

Many love musical theater, and the select few who aspire to perform it well can find ample support and resources at New York's independent colleges and universities.

Syracuse University offers one of the few specialized musical theater degree programs in the country, and its students delight in the university's new Tepper Center for Careers in Theatre, which was made possible by Broadway producer and SU alumna Arielle Tepper '94. A "total immersion" experience, the program gives advanced students the opportunity to study with New York City-based professionals in all aspects of theater, including musical theater. Musical theater students at Syracuse also gain West Coast entertainment industry experience through the support of alumnus Aaron Sorkin '83, creator and executive producer of "The West Wing."

At **The College of Saint Rose**, music education students exercise their operatic skills at the College's newly created Opera Workshop. The experience helps prepare them for producing high school musicals during their teaching careers. Cabaret theater is the genre of choice at **Adelphi University**, where students work on cutting-edge songs, parodies, sketches, and monologues.

At **Nyack College**, musical theater gets personal. Senior student James Gardner wrote, directed, and produced a musical based on the life of Nyack professor Dr. James Danaher, head of the Philosophy Department.

Students also run the show at the **University of Rochester** Off Broadway On Campus, the University's musical theater performing group, presents a revue of numbers from a variety of Broadway shows to sold-out audiences. The show is produced, directed, choreographed, and performed by students. The University also offers a musical theater workshop that uses theater training exercises and assignments from the Academy of Fine Arts in Berlin.

At **Marist College**, the Marist Council on Theater Arts teams up with the school's active music department to produce two musicals annually. At **Iona College**, the Iona Players focus on popular current productions, such as *Urinetown* and *Applause*.

One World One Heart: Music For All

No longer viewed as simply clubs for students to indulge in musical diversions, performance groups across New York's Independent Sector cultivate deep ties with their broader communities. Andy Russo, a Juilliard-trained classical pianist teaching at **Le Moyne College**, did so by establishing Music Journeys, Inc. This nonprofit foundation serves to introduce music to people of all backgrounds by organizing outreach programs and clinics for public schools in underprivileged areas of Syracuse. Says Russo, "Artistic institutions have a responsibility to the communities they serve and should avoid the temptation to run their organizations like an aesthetic country club."

At **Daemen College** students work hand-in-hand with MusicalFare, a top-flight local theater company, to bring award-winning productions to Western New York. MusicalFare Theatre has entertained over 300,000 people on the Daemen campus since 1990 and boasts a local economic impact of over 1.5 million in the 2004-05 season alone.

The **Keuka College** Symphonic Band and Keuka College Chorale actively invite community members to participate in their performance. **Manhattan College** singers extend invitations to the local community for their annual "Festival of Lessons and Carols," drawing in other ensembles to double their audience and performers. **Vassar College** also widely publicizes its music programs, sponsoring an impressive array of touring artists, recitals, master classes, and free public concerts. At **Sarah Lawrence College**, Vocal Minority (the men's a cappella group) and Treble in Paradise (the women's a cappella group) often perform in the community for free.

While **Nyack College's** 50-member Rockland Chorale tours Europe, it also regularly presents free concerts at local venues, such as retirement homes and churches. At the **University of Rochester**, the Eastman Chorale takes its full sound into diverse venues throughout the area.

Long Island University draws scores of enthusiastic participants, including local musicians, with its free Jazz Clinic and Concert Series. The University's LIU Chorus is open to area residents as well as faculty and staff members. "We have members ranging from age 18 to 70 – and from different backgrounds and a wide variety of disciplines and occupations," says LIU Chorus Director Gloria Cooper. "Sharing music fortifies our connections with each other."



Vaccine Victories

Through the creation of new vaccines and the testing and delivery of critical existing ones, the Independent Sector is helping to usher in a renaissance in the vital field of vaccinology.

Millions around the globe benefit directly from vaccines created by the scientists at New York State's independent colleges and universities. Yet research alone presents only part of this lifesaving picture. Independent Sector members test dozens of new vaccine candidates and ensure that vital existing vaccines find their way to the people who need them most.

Among them, the **University of Rochester** ranks as a world leader in the development and testing of a wide range of vaccines, targeting well-known killers such as HIV and pneumonia, common diseases such as flu and whooping cough, and recent threats such as bird flu and anthrax. Much of this groundbreaking work takes place in the University's David H. Smith Center for Vaccine Biology and Immunology. Here, scientists strive toward a heroic goal: customizing the body's immune response in a predictable way against pathogens.

Among the center's successes is the creation of conjugate vaccines, a special

kind of vaccine technology that has led to these common childhood vaccinations: pneumococcus, meningitis, and Haemophilus influenzae type b (Hib). In fact, this technology also became the most lucrative in the University's history.

The testing of new vaccine candidates takes place at the University's Vaccine and Treatment Evaluation Unit (VTEU). Here, nearly every new vaccine to be approved in the last three decades, such as malaria, herpes, and the common cold, gets a run through from every conceivable angle. Five separate studies on bird flu alone are being conducted currently at the University. Stretching supplies of smallpox vaccines, an issue since the September 11, 2001 tragedy, has also been the task – and triumph – of physicians at the VTEU.

Outreach efforts at the University mean that the Rochester community ranks among the best vaccinated and best monitored for vaccines anywhere. One new initiative aims to improve flu and pneumococcal vaccination rates among African-Americans and Hispanics 65 years and older.

Designer Vaccines

Imagine having your own personalized vaccine. It's in the works at Weill Medical College of **Cornell University** to treat non-Hodgkin's lymphoma, the fifth most common cancer in the United States. The personalized immunotherapy vaccine is created from a patient's own tumor cells to target a tumor-specific marker, which, like a fingerprint, is unique to each lymphoma patient. "Unlike other cancer treatments, these personalized vaccines will leave healthy cells unharmed," says Dr. John P. Leonard, Medical Director of Oncology Services.

Using your own immune system as a first line of defense to fight disease is also the plan behind Cornell's clinical trial of a novel vaccine to fight multiple myeloma, a cancer of the blood. In Phase 2 of the trial, the vaccine, called Mylovenge and made specifically for



each patient, is showing great promise. "The vaccine is part of a new era in cancer treatment," affirms Dr. Michael W. Schuster, Director of the Bone Marrow and Blood Stem Cell Transplant Program.

New Vaccines for Old Vexations

Our colleges have other exciting vaccines in the works for treating ailments from HIV to Alzheimer's to Septicemia. Those at Weill Medical College of **Cornell University** include one to slow Alzheimer's disease and another to prevent HIV infection. For Alzheimer's patients, the discovery that intravenous immunoglobulin (an antibody found in blood) can capture and draw out the central component of senile plaque (protein deposits in the grey matter of the brain that cause neural degeneration) is tremendously promising. More hope for Alzheimer's in the form of the herpes virus is being studied at the **University of Rochester**. A modified, harmless form of the virus is being used to create a vaccine that would spur a patient's immune system to fight Alzheimer's disease. (Read "Coping with Alzheimer's Disease." Visit www.cicu.org and click "Contributions to Our Communities.")

For the nearly one million HIV-positive Americans and others, the development of a preventive AIDS vaccine is big news. A **Cornell University**

team has shown that a virus-inhibiting antibody applied topically may be an effective method to prevent the spread of HIV.

At the **University of Rochester's** HIV Vaccine Trials Unit, more than a dozen different potential vaccines are being studied with the help of more than 800 volunteers from the Rochester community.

Polytechnic University is taking a mathematical approach to solving the problem of HIV's constantly changing nature in the body. Led by Professor Jose Pinto, who works in the area of mathematical optimization, the technique analyzes data such as genetic makeup, HIV strains, and patient histories to predict how the disease will progress and to identify the best course of treatment. This mathematical modeling route could lead to a more efficient, customized treatment plan for HIV sufferers. Most exciting, if successful, the model could be used for any number of diseases that require life-long treatment. Other researchers at Polytechnic's NSF Center for Biocatalysts and Bioprocessing are working on a treatment for sepsis, an infection of the blood. Scientists have found that the use of sophorolipids, a natural carbohydrate-attached lipid, help regulate the immune system and decrease the body's inflammatory response to the disease.

Cows, Warts, Nuns, and Priests

Twenty years of basic research by **University of Rochester** scientists led to a lifesaving discovery last spring. The team was instrumental in developing a vaccine against the virus that causes cervical cancer, potentially saving the lives of 230,000 women around the world.

Rochester's groundbreaking research began with scrapings from warts – which are caused by the same virus, human papillomavirus, that causes cervical cancer. The scientists collected warts from cows in upstate New York and conducted surveys of priest and nuns who had taken a vow of celibacy and therefore are unlikely to be infected with a sexually transmitted disease.

The vaccine, commercially called Gardasil, is given as a series of three shots administered a few months apart. Ideally, the vaccine is given before a person becomes sexually active to be most effective.



Bioterrorism and Vaccinations

Gene transfer technology represents perhaps the most advanced method of new vaccine development. The crutch of this technology is its fast-acting defense – a key to saving lives during a bio-terror attack. Research underway at **Cornell University** investigates the use of gene transfer technology to create a vaccine for anthrax. So far, the University's scientists have been able to immunize mice against anthrax in just 12 hours. "Compared to other vaccine technologies," reports Dr. Ronald G. Crystal, Chairman of the Department of Genetic Medicine, "this gene transfer strategy works very quickly."

The **University of Rochester** is trying to solve the problem of rapid mass vaccination against anthrax by developing a nasal spray that uses a common cold virus to deliver antigens. Two other possible biological weapons are under study at Rochester as well: smallpox and tularemia. Tularemia is a rare infectious bacterial disease with flu-like symptoms that causes organ failure if untreated.

Flu: A Mutating Menace

Creating an effective vaccine against the flu is a year-round effort. The virus is covered with protein spikes that are constantly changing, finding new ways to enter and attach themselves to the body's cells. To keep one step ahead of

the current strains, scientists must be able to identify the most recent flu viruses. In a process they call "decorating," chemists at **New York University** have made modifications to nanometer-sized virus particles. These particles are transformed into "contrast agents" – chemical compounds that enhance the ability of medical imaging techniques. Once "decorated" the particles can be recognized by specific receptors on the cell's surface, which allows for identification. Recognition is only the first step though. Scientist must also grow the viruses to provide starter kits for vaccine manufacturers. This is the task of virologists at **New York Medical College** in Valhalla.

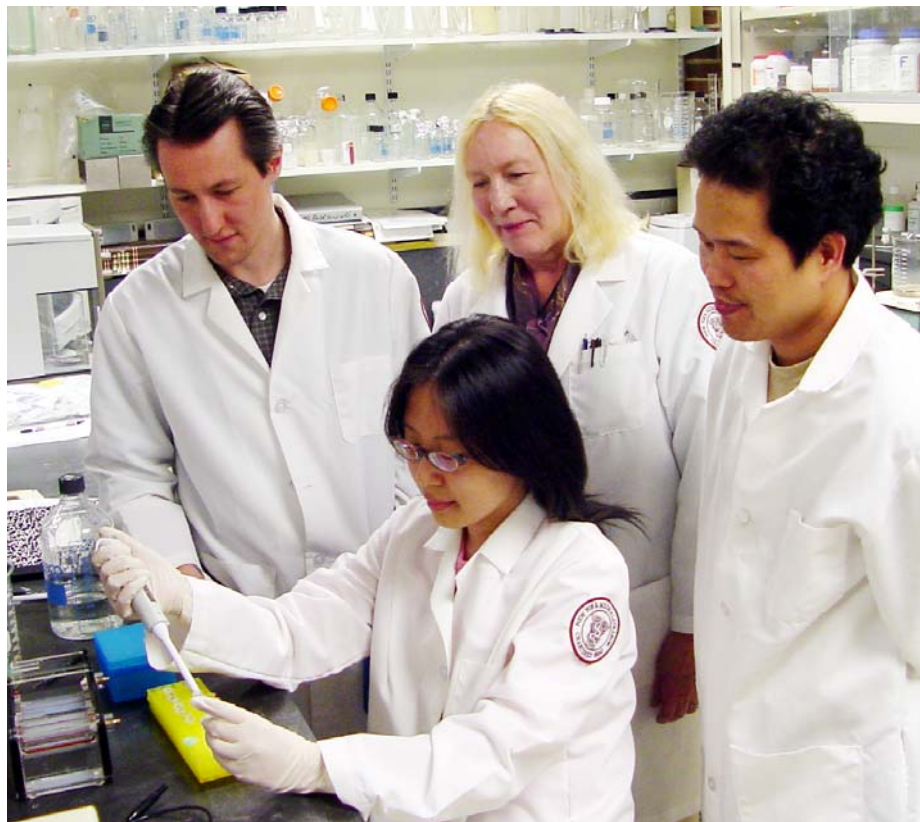
In fact, the College hosts one of only a handful of labs around the world to develop the strains used as the basis for some 300 million flu vaccine doses annually. Researchers create a hybrid by trying to grow the flu virus in fertilized chicken eggs. Their pioneering efforts have lead to rapidly-growing flu viruses – the most effective for vaccine use. Coincidentally, while flu strains can

originate in Hong Kong or China's Fujian province, the College discovered that the 2006 strain fares from home: New York's Westchester County.

While **New York Medical College** prepares the vaccine "starter kits" for worldwide distribution, scientists at the **University of Rochester** are investigating new methods of growing flu vaccines using insect cells. Rochester researchers are also looking into the effectiveness of the flu vaccine in infants as well as the vaccination rates of the elderly, who suffer the most complications from flu. The results of the University's effectiveness studies have led Medicare to cover the cost of more flu vaccines. They have also offered a way to extend the supply of the flu vaccine when it is scarce.

Perhaps most far reaching in the fight against the flu is a way to prevent or eliminate influenza infections altogether. This is the hope of scientists at the **University of Rochester** who are investigating new ways to stimulate immune "memory."

The most frightening flu of all, bird flu or avian influenza, remains an uncertain threat thousands of miles away. Still, scientists at **St. John's University** are acting now to figure out ways to block specific steps leading to infection. The St. John's team has developed an electronic map linking influenza and its human carrier cells. This online map instructs physicians about unfamiliar parts of the influenza lifecycle, hoping to nip its spread in the event of a pandemic.



New Vaccine Platforms

Edible vaccines? Although still a long way off, edible vaccines would be a boon for the people of developing countries because of their low cost and ease of use. At New York University chemists have made modifications to nanometer-sized virus particles that are showing important implications for vaccine development, among other attractive applications, such as imaging technologies (MRI scans). The possibility of engineering vaccines from virus particles in plants brings the future closer in our quest to advance human health globally.

Your Vaccines

Are you up to date on your vaccines? Many adults are not. Everyone needs a tetanus and diphtheria booster every ten years, and most adults need a second dose of measles, mumps, rubella (or MMR) vaccine between 19 and 49 years old and, again, after 50. Keeping your vaccines up to date will keep preventable, but life-threatening, diseases from damaging your life and the lives of others.

The **College of New Rochelle** created a computer program to assist the College in tracking all students for measles, mumps, and rubella compliance. The novel program is instrumental in helping the College achieve an outstanding 98.5 percent compliance rate for these infectious diseases – among the highest rate on campuses nationwide. In fact, the New York State Health Department has used the New Rochelle program as a model for other schools. For more information, visit New York State Department of Health's Web site at <http://www.health.state.ny.us/prevention/immunization/index.htm>.

Ever Wonder How Vaccines Work?

By mimicking a real infectious disease, vaccines "fix the fight" and teach your body important lessons about the opponent and how to defeat it.

Once a vaccine is injected into your arm, your cells called macrophages gobble up the "dummy" viruses as if they were dangerous. The alarm is sounded, and your immune system – a massive, complex army with multiple divisions – swings into action. Your first line of defense, the macrophages, shows pieces of the invader to T cells and B cells. These white blood cells, now able to recognize the enemy, carry out offensive and defensive actions as well as produce weapons – antibodies that bind to the offending viruses and bog them down, rendering them unable to function. These antibodies also signal to your macrophages and other defensive cells to come eat up the enemy! The battle is over quickly because the weak "dummy" virus in the vaccine can't put up much of a fight.

What you're left with is the most critical aspect of vaccination: a supply of memory T and B cells to protect you against the real disease for years to come or, as with some vaccines, a lifetime.

For more information about vaccines, visit the National Institute of Allergy and Infectious Disease at www.niaid.nih.gov.