It is somewhat intimidating to come to the Capital City Club to talk about leadership. After all, this is one of the oldest and most prestigious social clubs in the nation, and your membership is made up of successful leaders from all walks of life. I’m sure there is much about leadership that I could learn from each one of you, and in that respect I’d like to be sitting out there listening instead of standing up here talking. But I am also grateful for the opportunity to be here, because we are very serious and deliberate about leadership at Georgia Tech, and I am pleased to have an opportunity to talk with you about why leadership is so important for Georgia Tech and for our students.

I’d like to begin by looking at the world for which we are educating our students. There is no question that as we begin a new century, we are facing a new world. Last week Pulitzer Prize winning newspaper columnist Thomas Friedman was on the Georgia Tech campus discussing that new world with our students. He describes it as flat, but there are probably some who would disagree. Those who are the victims of off-shoring would probably say the world is tilted, so that jobs are sliding downhill from the United States to other countries where wages are cheaper.

But if you have read Friedman’s book, *The World is Flat: A Brief History of the Twenty-first Century*, you know that he is actually describing the leveling of the global economic playing field, which is threatening the economic leadership the United States has enjoyed since World War II. A vast web of information technologies now interconnects the world, and anyone with a computer and Internet access can be an instant player in the global economy. Rising technological competency in nations from Ireland and Finland to China and India means that skilled workers from anywhere in the world are only a mouse click away.

Population demographics indicate that 20 years from now, 56 percent of the world’s population will live in Asia, compared to just 4 percent in the United States. As Tom Friedman points out, even if only 10 percent of Chinese, Russians, and Indians become engaged in the global market, that is still more than the entire population of the United States. Already the number of cell phone users in China is greater than the entire population of the United States.

Nations like China and India have been deliberately investing in building world-class universities. Thirty years ago, the United States was conferring 54 percent of the world’s Ph.D. degrees. The brightest and best students from around the world were attracted to our shores for graduate study, and many of them stayed because career opportunities here were better than at home. However, by 2001, our share of the Ph.D.’s awarded around the world had dropped to 41 percent, and China, which was conferring no Ph.D. degrees at all 20 years ago, now produces 12 percent of the world’s Ph.D.’s.

What’s more, in China 40 percent of college students are majoring in engineering, compared to 6 percent in the United States. Just in this year, 325,000 Chinese earned engineering degrees
compared to fewer than 60,000 Americans. India and the European Union have also surpassed the United States in graduating engineers.

Doctoral graduates in nations like India and China also have a growing range of opportunities for employment at home. As these nations develop world-class universities and offer skilled workforces, we are seeing high-tech corporations move their research and development facilities overseas. Microsoft’s biggest R&D facility is not in Seattle, but in Beijing, China. GE’s Jack Welch Research Centre in Bangalore, India, employs 2,500 scientists, and CEO Jeff Immelt recently announced a $250 million medical facility to be built in New Delhi. Pharmaceutical giant Merck & Company has major research and development facilities in 11 nations.

A study done by McKinsey & Company in June of this year indicates that low-wage countries have 33 million young professionals who are university graduates with up to seven years of work experience, compared to 7.7 million in the United States. China is producing engineers six times faster than the United States; India is producing engineers three times faster than the United States. And what’s more, a corporation can hire five chemists in China and at least that many engineers in India for the cost of one equivalent in the United States.

We clearly cannot compete in this new world based on the wages we pay, and I am not convinced that we can compete on the numbers, either. Several organizations are calling for American universities to double the number of engineers that we graduate. But I do not believe that doubling the numbers by itself will be enough or even may be possible in the present circumstances.

So what, exactly, will make Georgia Tech students competitive on the world labor market and allow them to have a successful career? What can our students offer that corporations cannot get in India and China? The answer to that question is also found in the same McKenzie study. While that young professional workforce in low-wage countries has technical skills, less than 15 percent of them have the more sophisticated skills they need to evolve as leaders. They lack language and communication skills. Or their education was focused on rote memorization and did not develop their problem-solving or creative-thinking skills. Or they do not have any cross-cultural or teamwork skills. Or a combination of these.

What all of this argues is that in the future our engineering and science graduates need a more well rounded skill set, one that will allow them to live life well as their career needs change. Three weeks ago I served as co-chair of a workshop at MIT which focused on the needs of the workforce and how universities would meet them. We concluded that it is not a matter of producing more engineers or scientists, but a matter of producing different types of graduates, who, while they still need to be competent professionally, also need to be good communicators and team players, have a broad understanding of world cultures and economies, and have an intuitive appreciation for innovation. Here I mean not only the creation of new ideas, but how to organize a business plan around them to bring them to the marketplace. Finally, we felt engineers and scientists also need to be exposed to leadership so they will be prepared to take on this role when the call comes.
Looking back at Georgia Tech, we have traditionally done very well at educating students who can apply engineering skills and technologies to produce new products and processes that are better and more cost-effective. But that is no longer enough. We must do more than just prepare our students for success as individuals, because the best hope for our future as a nation and even as a planet is walking around the Georgia Tech campus in blue jeans even as I speak. Our students are incredibly bright and talented. The caliber of our incoming freshman class is always among the very best of any public university in the nation, and The Times of London ranks us among the top 100 universities in the world. Georgia Tech’s student body represents the talent pool from which our nation’s leaders of the future will come. These are kids with tremendous potential to provide outstanding leadership to our nation and the world if we give them the tools they need to rise to that opportunity.

Scientists and engineers have always created the technology that enables humans to prosper, but too often they have been behind the curve in foreseeing and understanding the human aspects of technological change. However, as technology has invaded virtually every sphere of life, technology and social change have become a double helix – two strands inextricably intertwined with each other. As a result, there is an incredible demand and opportunity for leaders who understand both of those strands and can make them work together for the well-being of all. Our students must be able to see their work in its larger social context and understand its human dimensions. They need cross-cultural experiences and a comfort level with diversity. They need teamwork experience, and sound oral and written communication skills. They need to learn to think for themselves and to solve open-ended problems in creative ways.

This is a different list of leadership skills than the hierarchical, military-style model that many of us in my generation grew up with. But we are seeing the traditional hierarchy flatten out to serve a new world that requires nimbleness and agility. For example, Microsoft recently reorganized its entire corporate structure to speed up both the decision-making process and the execution of those decisions. The old, more autocratic, hierarchical model of leadership has given way to a new style that involves more interdisciplinary teamwork. The most effective leader in today’s world is not necessarily a person who issues lots of top-down commands, but rather one who can define the problem, identify the resources needed to solve it, and bring those resources together to work in concert to achieve the optimal solution.

Which is to say that our students need to understand that to lead is to serve. As Max DePree put it in his book The Art of Leadership, “The first responsibility of a leader is to define reality. The last is to say thank you. In between, the leader is a servant.” If we are to produce tomorrow’s leaders, we also need to give our students a framework for constructing a value system that enables them to make sound, ethical choices in the face of the many conflicting messages swirling around them that do not provide much help.

This year we celebrated the 10th anniversary of the commercial Internet, which was launched on April 30, 1995, when the National Science Foundation privatized access to the computer network it had created. Over the course of the past 10 years, 600 billion web-pages have been created – 100 for every living person on Earth. Our world is awash in information, but that does not mean that we are knowledgeable or wise. Students arrive on our campus already wired and hyperlinked. But they often are not very good at valuing or making sense of all that information.
Many of them have only a sketchy understanding of history, social science, literature, and philosophy, and they are rarely able to think critically or comparatively among various bodies of knowledge.

To educate engineers for leadership means adding the counterbalance of knowledge that is enduring and provides an anchor and a framework in today’s high-velocity, almost reckless technological world. Our goal is not only to teach students how to see the cultural context of technology, but also how to value it — how to sort out the wheat from the chaff, the enduring from the short-lived trends, the important from the trivial. If they are to become leaders, our students must learn to reason, to compare, to analyze, and to define problems as well as to solve them. They must learn to be independent of thought, but at the same time mindful of community. If we can do all of that, we will have given our students a framework for wise decision-making that will serve them well all of their lives.

So, how are we changing education at Georgia Tech to produce renaissance scientists and engineers? Several years ago we began a multi-faceted process to move us in this direction, and I’d like to tell you about several of aspects of it. We started by revamping our admissions criteria be more inclusive of what it takes to be a leader in the world ahead. When I think of the most successful engineers I know, they were not always the ones who had a 4.0 grade point average in college. But they are individuals who are comfortable with change, who can assimilate information and ideas across disciplines, and who can communicate well. There are different wellsprings for creativity and some don’t directly correlate to SAT scores. So we redesigned our admissions process to capture those as well, and we are attracting more well-rounded students.

To help our students critical thinking skills in open-ended situations where there is no one, single “right” answer, we developed a wide array of opportunities for undergraduates to participate in structured ways in our research labs. We have now reached the point where 40 percent of our undergraduate students engage in structure research activities for academic credit or pay during the course of their undergraduate career. This year, we moved to the next level by creating the Undergraduate Research Option, which enables students to permeate their education experience with a research focus across several semesters. They conclude by writing up the results of their work in a thesis paper, and receive a special designation on their academic transcript.

We took a similar approach to the task of making our students global citizens with cross-cultural skills and an understanding of the broader world they live in. We began by expanding our study-abroad and language programs and creating several that are unique to Georgia Tech. For example, a student can spend a year in Germany, combining a semester at the Technical University of Munich with an international internship at Siemens. A third of our undergraduates now study abroad, which is stunning rate for a technological university.

But we’re not done yet. This fall we began the International Plan, which results in a special designation attached to a student’s degree. In addition to their major, students in this plan take a second language plus courses in international affairs and global economics. Then they do at least two international study-abroad programs or international internships. A capstone course integrates their international experiences with their major. With the International Plan underway, we hope to gradually increase study abroad participation to 50 percent of our undergraduates.
As our study abroad programs have become more mature, the range and impact of the experiences have deepened. For example, in Angola students join faculty in surveying and advising the government on the immense infrastructure and environmental problems caused by thirty years of war. In Honduras, students help run water lines to rural communities. In an Ecuadorian canton where population is expected to triple over the next three decades, students and faculty are helping to plan for orderly growth and the provision of services.

To discover the impact of these programs on our students, we surveyed Georgia Tech alumni who graduated between 1998 and 2001. Those who had engaged in research as undergraduates felt well prepared to design and conduct experiments, and reported enhanced abilities to analyze and synthesize data and to integrate ideas. Those who studied abroad said it had enhanced their leadership abilities. They were comfortable in culturally diverse environments and able to mediate and resolve conflicts in a group or a team. Many explicitly gave credit to these experiences for their ability to do well in their careers, to adapt to the changes they experienced, and to prepare for the next stage in their lives.

We are also in the process of developing a certificate program specifically in leadership to be developed by our newly hired first full time professional in leadership education, Philip Thompson. The introductory course, which we will offer for the first time next semester, is called Foundations of Leadership. Its three components are: understanding the principles of leadership, learning the skills of leadership, and applying leadership in practice. After this course, the students will take additional classes in organizational leadership, ethical leadership and global leadership.

In addition to initiating broader programs, we have also been revising our curriculum to accomplish several goals. One, of course, is the ongoing process of creating new programs that speak to the needs of the 21st century. They range from global executive master’s degree programs in business and logistics that include international residencies, to a 12-credit-hour certificate program in nanoscience and nanotechnology.

A second goal is to incorporate leadership development into the classroom through more studio courses, more case-based learning, more team projects, and more capstone courses and projects that gather together the many threads of a student’s field of study into an applied exercise.

A third goal is to permeate our curriculum with and understanding of and appreciation for, environmental sustainability. Many universities have responded to the growing environmental issues and concerns that surround us by creating special courses and majors in environmental science, and Georgia Tech has done that as well. But we also believe that environmental sustainability should be part of everyone’s mindset, and that it sets the tone for a thoughtful, value-laden approach to creating our future. So we endeavor to make sustainability an integral part of all of our education, research, and economic development programs, even into the way we design our buildings and operate our campus. We incorporate sustainability into our required core curriculum for all students, so that their basic education comes through the prism of sustainability, and sustainability is emphasized in their earliest experience with defining and understanding their chosen discipline.
Finally, I would be remiss if I didn’t mention the many opportunities that our students enthusiastically embrace to develop their leadership skills through extra-curricular activities. From tutoring younger K-12 students, to volunteering at hospitals and homeless shelters, to building homes with Habitat for Humanity, thousands of our students are actively engaged in service activities. They turned out in record numbers to volunteer in the immediate aftermath of Katrina, as our campus housed student evacuees from Tulane University as well as a Red Cross service center. Experiences like these help them learn to lead with their hearts as well as their heads. And we are working to become a little more systematic about evaluating and coordinating our extra-curricular activities to maximize their quality and leadership value.

At Georgia Tech, we believe that a college education must be more than simply an item of currency to be traded on the job market. To quote Jeremy Farris, who was named a Rhodes Scholar a year ago as a Georgia Tech senior, “The purpose of an education isn’t to get you a job. The purpose of an education is to change you, to make you sufficiently human.”

And that is our goal – to educate young people who are prepared for leadership not only because they have succeeded in an academic program that is among the most rigorous in the nation, but also because their understanding of the world has been enhanced and they have developed the value system and human skills that will enable them to make the world a better place.