

# MIT Faculty Newsletter

<http://web.mit.edu/fnl>

**in this issue** we ask for faculty support for a Campus Planning Committee (editorial) as well as the need for more on-campus housing (below). We also offer commentary on both postdoctoral researchers (below) and doctoral education outcomes (page 16).



## The Status of MIT Postdoctoral Researchers

Hazel Sive, Claude Canizares, Maria Zuber

### Introduction

**IN MANY FIELDS STUDENTS** who complete the PhD take up a postdoctoral position. This has been common for decades in most areas of science, and is becoming increasingly common in engineering. A postdoctoral position allows a researcher to devote full attention to developing research skills, accruing additional publications, and becoming more competitive in the job market. It is often a time for deepening or broadening one's dissertation research or moving in new research directions.

The MIT postdoc population is extremely important, as postdocs perform much of the groundbreaking research at the Institute and are critical members of research groups, working closely with faculty, graduate students and often undergraduates. However, this

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## MIT's Responsibility to Provide Additional Affordable Housing for Grad Students, Postdoctoral Fellows, and Staff

Frederick P. Salvucci

**IT HAS BEEN ARGUED** for some time that lack of affordable housing in the Boston area is impeding the ability of the Boston economy to grow. It is now becoming evident that the lack of affordable housing for graduate students and postdocs is becoming a problem at MIT, and that MIT is becoming both a cause and a victim of the affordable housing shortage.

Many of the graduate students I work with find that by teaming up with one or two other grad students, they can find more affordable housing off campus, rather than competing for the scarce, and somewhat expensive on campus housing available. But over the past several years, as the supply of housing in Cambridge has become tighter, they are traveling farther and farther afield to find housing that they can afford, in communities like

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### Editorial

## Preserve MIT's Campus Through Sound Long- Range Planning: Support Establishment of a Campus Planning Committee

**ALTHOUGH WE OFTEN TAKE** it for granted, MIT's campus between the Charles River and urban Cambridge undergirds our rich intellectual environment. The interaction among talented students, faculty, and research staff is critical for productivity and innovation. In newer buildings, great attention has been given to maximizing opportunities for communication. Such face-to-face interactions cannot be matched on commuter campuses, which is one reason why most leading U.S. colleges and universities are residential campuses. The Internet may possibly enhance experimental skills, teaching, and interchanges that take place in many laboratories, but use of the Internet alone remains sub-optimal in many fields, even with the growth of digital distance learning.

Given the importance of the campus itself for MIT's productivity, it is surpris-

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Vol. XXVI No. 2 November/December 2013

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Photo credit: Page 1: Housing Division, City of Cambridge

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### Subscriptions

\$15/year on campus

\$25/year off campus

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**Support a Campus Planning Committee**  
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ing that MIT lacks Campus Planning as a Standing Committee of the Faculty. We doubt that the radical decision embodied in the recent MITIMCo petition, to a) Build two or three large commercial office buildings in the heart of the East Campus, and b) Decline to build graduate student housing, would have survived full faculty scrutiny.

The latter decision is likely to make MIT less desirable for potential graduate students as the housing market tightens in

the next few years, impacting particularly our junior faculty. It is ironic that one of the pressures on the graduate housing market will be the thousands of new personnel employed in the new campus commercial office buildings.

The administration recently announced the selection of a group of architectural, development, and consulting firms to advance the MITIMCo plan for Kendall Square and the East Campus. Launching a design process before deciding whether the East Campus land ought to contain more commercial development, graduate student housing, or academic facilities, or some

defined mixture, puts the cart before the horse. Consultants without a stake in the life and work of our campus are not a substitute for an actual Campus Planning Committee.

We therefore encourage our colleagues to attend the next two faculty meetings in which a motion to establish a new Standing Committee of the Faculty on Campus Planning will be introduced, debated, and voted upon. (See next page for the complete motion.) Without significant faculty attendance there may be little action, simply owing to the lack of a quorum. ■

Editorial Subcommittee

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## Vote for New FNL Board Members

**IN THE COMING WEEKS**, all faculty and faculty emeriti will be receiving an e-mail with a link to a page with the current list of candidates for election to the Editorial Board of the *MIT Faculty Newsletter*.

Following procedures outlined in the *Policies and Procedures of the MIT Faculty Newsletter*, this will be an Institute-wide election. All regular faculty members and professors emeriti will be eligible to vote.

Nominees for the Editorial Board will have been selected by the *Newsletter* Nominations Committee from submissions by the Institute faculty.

Elections will be electronically based, with each eligible voter receiving an e-mail with a link to the voting site. Faculty and faculty emeriti will need to have MIT Web certificates installed on their computer, to allow for voter authentication. No record of individual voting preferences will be kept.

According to the *FNL Policies and Procedures*:

*“The Nominations Committee will have the responsibility of recruiting and evaluating candidates for the Editorial Board, taking into account the need for representation from different Schools and sectors of the*

*Institute, junior, senior, and retired faculty, male and female, underrepresented groups or faculty constituencies.”*

*“Candidates for the Editorial Board should give evidence of commitment to the integrity and independence of the faculty, and to the role of the Faculty Newsletter as an important voice of the faculty.”*

To our knowledge, this is the only Institute-wide faculty election. We encourage the participation of everyone eligible to vote. ■

Editorial Subcommittee

## Proposal to Establish a Campus Planning Committee

MIT's Charles River campus, with its buildings, open spaces, and landscape, is an essential component of the Institute's educational and research environment. The faculty, students and staff are essential stakeholders in the Institute's educational and research functions. The rapid economic development in the Kendall area, increased scarcity of available land, and increase in real estate costs, call for very careful long-term campus planning to ensure the availability of space to support future academic needs of MIT. Critical decisions affecting the future of the campus should be made with the fully considered input of the above stakeholders.

Therefore, a Campus Planning Committee—composed of a majority of faculty members elected by the faculty, together with student, staff and administration representatives—shall be established as a Standing Committee of the Faculty, prior to the end of the Spring 2014 semester.

### Motion

Moved that Section 1.70 of the Rules and Regulations of the Faculty be amended as indicated (deletions stricken, additions in bold):

1.71

There shall be Standing Committees on the following: Faculty Policy, Graduate Programs, Undergraduate Program, Curricula, Undergraduate Admissions and Aid, Academic Performance, Student Life, Discipline, Library System, Outside Professional Activities, ~~and~~ Nominations, **and Campus Planning**.

Each member of these Standing Committees elected from the Faculty at large shall serve a three-year term, approximately one-third of the elected membership being elected each year.

The undergraduate and graduate student members, if any, of each Standing Committee shall be appointed from an ordered list of nominees provided by the respective student governments. The term of student members of the Standing Committees shall be one year, and shall begin on July 1.

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It is further moved that new text be inserted as Section 1.73.11 of the *Rules and Regulations of the Faculty* as follows:

1.73.11

**The Committee on Planning shall consist of six elected Faculty members, one undergraduate student, one graduate student, and ex officio, the Registrar, the Executive Vice President (or designated representatives), and one additional member designated by the Provost. The Chair of the Faculty shall appoint the Chair of the Committee from among the group consisting of the six elected faculty members.**

**The Committee shall keep itself informed of plans relating to the future of the campus and shall be concerned with the relationship of construction projects and space planning to the activities of the Faculty and the future academic needs of the Institute. The responsibilities of the Committee include representing Faculty interests and perspectives in the development of the campus and its surrounding properties, including mechanisms of stewardship and oversight. The Committee shall insure that major construction and renovation projects are discussed and assessed by the Faculty.**

Respectfully submitted,

Nazli Choucri,  
Jean Jackson,  
Jonathan King,  
Helen Elaine Lee,  
Ruth Perry,  
Nasser Rabbat,  
Frederick Salvucci,  
Frank Solomon,  
Roger Summons,  
Seth Teller.

## Beyond the Classroom

# EECS Undergraduates: SuperUROP, EECSCon, and USAGE

Anantha P. Chandrakasan

**OVER THE PAST TWO YEARS**, an important focus for the Electrical Engineering and Computer Science (EECS) Department has been to expand the research experience and opportunities for our undergraduate students, while also fostering a stronger sense of intellectual community and ownership in the Department.

### SuperUROP

The UROP program provides an excellent experience for students, allowing them to sample and engage in advanced research activities. UROP was launched in 1969 as a bold experiment to bring younger students into the research laboratory for the first time. More than 80 percent of the Institute's undergraduates now participate in this widely copied program. (See M.I.T. Numbers, next page.)

Yet only a small fraction of our EECS undergraduates had been choosing a sustained multi-semester project that could result in meaningful and publication-worthy research. Looking back on my own experience as an undergraduate at U.C. Berkeley, an extended research opportunity played a key role in getting me excited about graduate school and an academic career. I got to interact with my faculty advisor and graduate students while accessing the most advanced tools and equipment.

EECS launched SuperUROP in the fall of 2012, in collaboration with the UROP Office. The program provides EECS juniors and seniors who have already completed a conventional UROP experience the opportunity to engage in a sustained research project, with the goal of produc-

ing publishable results or advanced prototypes that could be commercially developed. I would like to see SuperUROP serve as a jump-start on graduate school, a startup accelerator, and an industry-training boot camp, all rolled into one.

SuperUROP builds on the UROP program and provides greater exposure to the rewards and complexities of scientific investigation and engineering development. In addition to working with a faculty member and his or her graduate students and postdocs for the entire academic year, participants come together in a two-semester class, "Seminar in Undergraduate Advanced Research," (6.UAR) that meets weekly. The subject covers topics ranging from selecting projects and research topics in EECS to entrepreneurship and ethics in engineering. Part of the objective is for students to gain breadth in EECS research and application areas, including through interaction with invited speakers from academia and industry. There is a strong emphasis in the class on improving communication skills through writing technical papers and learning to give poster and oral presentations. Students also learn to distill their research ideas and results into concise pitches aimed at audiences ranging from fellow students and engineers to industry executives and venture capitalists. The seminar includes social opportunities for students to get to know each other and develop a sense of community.

Upon completion of the program, SuperUROP students receive a certificate in advanced undergraduate research, with a designated focus area. In its inaugural year, 77 students completed the program,

and 81 students are enrolled for AY2014.

The SuperUROP program is supported by the Research and Innovation Scholars Program (RISP), which funds students through named scholarships during the SuperUROP, and also provides some associated discretionary funding for the host research group. RISP is enabled by generous support from corporate and individual sponsors, all of whom are committed to growing the SuperUROP program and enhancing the undergraduate student experience at MIT. The industry mentors provide project suggestions and research directions, and detailed feedback on the technical aspects of the project.

Students also engage in entrepreneurial activities, including the opportunity to interact with successful entrepreneurs and investors in class and through networking events. In addition, the students access MIT's sophisticated facilities, such as the Microsystems Technology Laboratories – a privilege typically reserved for graduate students, thus expanding the scope of what is possible in their SuperUROP project.

### EECSCon

In April this year, the Department also held its first undergraduate research conference, EECSCon. This off-campus one-day event was student-organized with faculty oversight. The meeting featured poster and oral presentations by undergraduate students doing UROP, SuperUROP, or other research in EECS areas, and included generous prizes for

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### EECS Undergraduates

Chandrakasan, from preceding page

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outstanding research and presentations. Seeing the quality of the work presented, as well as the excellent planning and execution of the conference, was tremendously gratifying to me.

### USAGE

One of my best early decisions as department head was to form the Undergraduate Student Advisory Group in EECS (USAGE), comprised of over 30 undergraduate student volunteers from

across the Department. USAGE provides critical student input to the department leadership group, helping guide curriculum development and enhancements (for example, with a new medically-oriented EECS program or with entrepreneurship in EECS); improves response rates on course evaluations; develops a role for undergraduate students in faculty search; and shapes IAP activities. The final specific form of the SuperUROP program owes a lot to thoughtful input from USAGE. The Department also engaged students in the faculty search committee after input from the USAGE group. While

students had met with faculty candidates in the past, the Department had never before formally requested student input into the hiring decision.

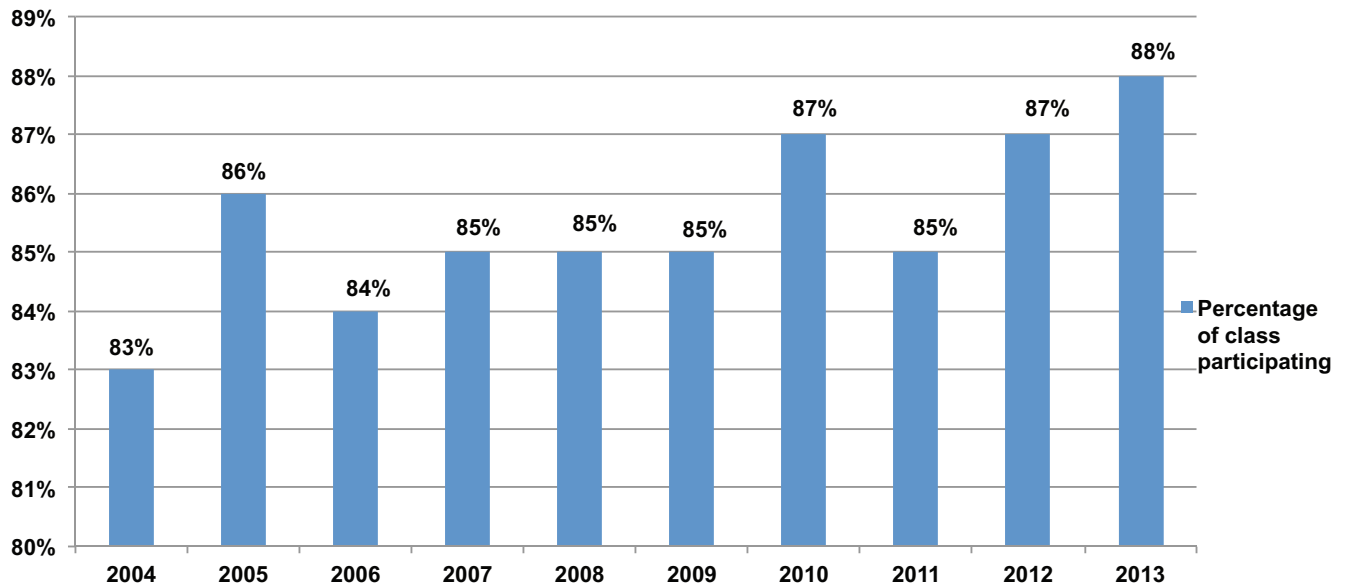
One of my highest priorities as department head is to help our undergraduates apply their talent and drive to curricular and extra-curricular initiatives in the Department, as well as to bigger societal challenges, empowering them to lead in these efforts. ■

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## M.I.T. Numbers

### UROP Student Participation By Graduating Class



Source: Undergraduate Research Opportunities Program



## Three Suggestions

Ernst G. Frankel

### There Is No More Need For Nuclear Power Plants In The USA

**RECENT DEVELOPMENTS AND** difficulties in sealing the damaged nuclear reactors in Fukushima, Japan and studies of the long-term effects of the Chernobyl nuclear reactor disaster should convince us to revise our nuclear power strategy and shut down the remaining power reactors for good. There is little economic reason for keeping nuclear power reactors such as the small 50-year-old plant in Plymouth, Massachusetts operating. We have plenty of cheap, relatively clean natural gas and other energy sources.

Recent reports on the long-term effects of radioactivity as well as increasingly frequent natural disasters and terrorist attacks make such power plants unnecessary threats to safety, without compensatory economic benefits. For example, a major leak at the Plymouth nuclear power plant would likely isolate or make Cape Cod inaccessible if not, in part, uninhabitable. We need to take heed of the Fukushima example, where the owner, Tokyo Electric, resisted for years drastic but necessary actions which would have permanently sealed the damaged reactor under hundreds of tons of concrete, in an attempt by the owners to save their investment by continuing to add cooling water, without adequate facilities for its storage after irradiation. The result has been a huge flood of radioactive waste water into the surrounding load and coastal waters.

We should learn from this experience and finally safely shut down these 50-year-old obsolete nuclear power plants – and stop gambling with our safety.

### The Problem and Challenges of Population Growth

**THE WORLD'S POPULATION** is expected to reach seven billion by 2020 and top off at nine billion by 2050, and then start to decline. With an increasing number of the world's population above 65 years of age and life expectancy likely to increase to over 70 worldwide, an adjustment in the retirement age will be essential. The retirement age will need to be increased by at least one year every two or three years from now until 2050, and then reviewed again.

This trend is also affected by the consistently rising age at which people start full-time work. In many Western countries it has risen from 19.2 years to over 22 years, as the percentage of college attendees has risen to over 84% in the U.S. and over 50% in most developed countries. As a result, the percentage of the population in full-time employment is declining and the underage and retired population is rapidly increasing. We urgently need a new paradigm of working life as the current system is unsustainable.

While the length of the working life in most countries is remaining the same or is reducing, as more people spend another four years in higher education, the retirement age has remained nearly constant. As a result, the ratio of working years to retirement years, which for so long had been 4/5, has now declined to 3/4 or by 20-25%. This is barely sustainable as the ratio continues to decline and there will be fewer and fewer workers to support the rapidly growing numbers of retirees, children, and students.

As a result, contributions to Social Security and other entitlement programs are expected to fall into the red requiring changes in relative (contribution to payment) terms, making these programs

increasingly unsustainable. We may need a complete change in our social contracts. Apart from changes to the retirement age, we may have to tie social contracts to fiscal as well as demographic and social realities. Unless we develop a plan to achieve this, we will suffer both economic problems and a loss of our social contracts. Educational institutions may have to lead the way so that our politicians have the moral support needed to accomplish this.

### Building Codes to Reduce Fire, Storm, and Tornado Damage

**THE STORM DISASTER** in Moore, Oklahoma that caused large loss of life, property damage, and general devastation so soon after the Sandy storm devastation of New Jersey and New York, again shows the lack of effectiveness of U.S. building codes and construction methods. Most single-family houses are built from lumber, using 2x4 studs and plywood. Such construction is labor intensive and material is cheap; yet it results in building homes easily damaged by wind, fire, or break-ins.

Surveying the damage after Hurricane Katrina in New Orleans and more recently Sandy in New Jersey and New York, it was found that buildings made of concrete and even concrete blocks withstood wind and weather much more effectively. Such buildings are obviously also more fire and burglar resistant. U.S. building codes and material choices should be reviewed to assure safer and more resilient housing. While material costs may be a bit higher, insurance and maintenance cost savings will easily make up the difference. ■

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## Should MIT Create a School of Education?: A Response

Garo Saraydarian

**THE IDEA OF A** School of Education at MIT is timely. In our global knowledge-based economy how we educate our children and ourselves is one of the most important topics our society will need to consider. However, if such a School is to truly have a powerful and purposeful impact on the way we think about, organize, and discuss public education, it must avoid misconceptions that unfortunately distort public discussion and policy decisions.

Too often educational policy is dictated by rapid swings of the pendulum that are based on hysterical “reports” and/or studies by ideologically driven think tanks. Much of the evidence used to drive the dialogue of education reform is based on generalizations and lack of empirical evidence that would be deemed standard and unscholarly in any other content area that is taught at the Institute. These misconceptions are derived from poor research techniques, insufficient data, hearsay, political agendas, and anecdotal personal experience (or lack thereof). If a School of Education at MIT is not to become one more clone of blind *a priori* thinking to poison and muddy the waters, it must stay clear of these all too common assumptions.

### Misconceptions

The statement that “many parents have lost confidence in the K-12 public schools” is an example of the overgeneralized statements that a School of Education at MIT should not only avoid, but actively seek to erase. What research has shown is that there is a wide spectrum of student achievement and inequity in

the quality of public schools, with a very high correlation with the socio-economic status of the local community. To stereotype a public school system that is so decentralized and diverse as ours as failing is grossly inaccurate. Ironically, while many people decry the straitjacket of “standardized testing” those same tests are

Too often educational policy is dictated by rapid swings of the pendulum that are based on hysterical “reports” and/or studies by ideologically driven think tanks. Much of the evidence used to drive the dialogue of education reform is based on generalizations and lack of empirical evidence that would be deemed substandard and unscholarly in any other content area that is taught at the Institute.

often used as the sole proof that our public schools are “failing.” Further, there is no long-term research that provides data that charter schools are more successful than their traditional counterparts. In fact, the few research studies that do exist suggest that charter schools perform no better and sometimes perform worse than traditional public schools.

The assumption that public school classrooms are uniform and standardized reflects a lack of experience in most contemporary classrooms. The concept of “differentiated instruction” in which student learning is driven by taking into account individual students’ learning styles, interests, and readiness was actually developed and conceived by public school educators. The use of differentiated instruction in teaching and organizing the classroom is currently required as part of the certification, tenure, and ongoing

evaluation process of every educator in the Commonwealth of Massachusetts.

Many public schools are also on the forefront of technology in the classroom through interactive whiteboards, projectors, Web apps, and iPads. In fact, my elementary classroom is more technologically equipped for learning

than many classrooms I have observed or taught in while at MIT.

### Conceptions: How MIT can be Different

- The starting point of any discussion on education must begin with an emphasis on valid and reliable research that describes actual situations in American public schools. This would include long-term physical observation of a wide range of schools and communities that generates significant qualitative data, not merely quantitative analysis of testing.
- Informed discussion of what we as a democratic society want our children to know and be able to do: Is our emphasis on science education (the so-called STEM subjects) or do we believe in a skill and knowledge base that includes humanistic and kinesthetic studies?



What can research tell us about the best mix and balance of subject matter and instruction in a curriculum so that different knowledge acquisitions and skill sets empower and connect with each other? Who is to determine what kind of knowledge and skill set defines being an educated person: corporations, entrepreneurs, academics, educators?

- Development of assessments based on the consensus of skills and knowledge that research and democratic discussion has determined is essential to a student's general and subject-specific education. These assessments should guide teaching and develop best practices rather than be distorted into high-stakes punitive tests. What blend of qualitative and quantitative assessments (both informal and formal) will give educators the most complete picture of student achievement and
- As many community health centers are discovering, there is a high correlation between poorly performing public institutions, such as certain public schools, and the local economy, social fragmentation, and personal/family health. Any solution must take into account the thick context of all these factors and seek to understand their interaction.
- Generate and lead public inquiry and discussion that is transparent and

involves all stakeholders: students, parents, teachers, administrators, academics, researchers, unions, private organizations, and government.

MIT is perfectly poised to create a School of Education. Not only does the Institute have the obvious strength and experience of scientific research and technological development, it has the unique asset of a strong synergy with the humanities, providing a deep toolbox in which to tackle the complex idea of human education. If such a School were to be created, and if it remained faithful to this core identity, it could meet an opportunity to nudge the landscape of public education in a more positive and intelligent direction. ■

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## letters

### An MIT School of Education . . . and More

To The Faculty Newsletter:

**I READ WITH INTEREST** the idea for a School of Education at MIT. This needs to be considered seriously, but not just as a new school of the study of pedagogy, but in the spirit of *mens et manus*, a hands-on real-time try and study as it goes: In other words, educational anthropologists and psychologists study how students learn and teachers teach in regular curriculum, while also doing the same for alternative education programs at MIT (e.g., Concourse, ESG, Terrascope, TBDs and the clubs [e.g., FSAE, EV, ORCA, Solar Car, Theatre, TBDs...]). AND to truly add the MIT spirit of innovation and creation of disruptive technology development, the alternative education programs should have complete control to offer GIR subjects, including HASS classes, where content review boards of the traditional

schools at MIT (So\_\_) to provide peer review to the course syllabi and content; and in the end, our colleges TRUST each other to do the right thing and use the peer review to evolve the content and then implement the result. There will be, of course, disagreements about content and delivery, but no So\_\_ can veto a course the new School proposes to teach as a GIR alternative, and that is a good thing!

Potential disagreement in fact means the experiment SHOULD be run because there could be some exciting positive results. The worst case would be the students do not get all the stuff regular curriculum classes hope to teach, but the number of undergraduates "affected" will be only at most 10% of the class. The potential upside is just too big; for example the Socratic and hands-on style used by our alternate education pro-

grams which was barely tolerated (with great effort) for many years but the teaching style (interactive hands on, come to class prepared) is now becoming mainstream.

And let's call the new School the "School of Learning and Research" (SOLAR) as investigating something about which you are passionate is a key catalyst to learning. And true to the spirit of the many new cross-disciplinary divisions at MIT, it should be easy for educators from across the Institute to move in and out of SOLAR to try new things with ease and then bring the results back to mainstream. Perhaps the new School can also have an updated motto: *Geeks et Geekus!*

**Alexander Slocum**  
Professor of Mechanical Engineering

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**MIT's Responsibility to Provide Housing**  
Salvucci, from page 1

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Somerville, Brighton, and Allston. The round trip by public transit to Brighton requires at least one and a half hours per day, time that a graduate student needs for studying. Confronted by the long commute, many use bicycles, much celebrated as the green alternative, but also dangerous, particularly in harsh weather.

Each year the problem gets more acute as rental prices keep rising in response to rising demand and a finite supply. Beyond Brighton lies Newton, too far and not affordable. The supply of wood frame two- and three-story housing that has served as an affordable housing stock for working class families for over a century is saturated. The owner-occupancy and self-help maintenance that has preserved that housing stock in reasonable condition for this length of time are giving way to absentee ownership and either poor maintenance or higher expense paid maintenance, and each year the finite and aging housing stock becomes less affordable.

The problem is becoming more acute as a new demographic phenomenon is occurring driven by the economic growth in the Kendall Square area, stimulated in part by the presence of recent MIT graduates drawn to Cambridge and Boston to work in the new economy. These recent graduates have income to bid the price of the limited available housing even higher. This is not to decry the economic growth of which MIT is justifiably proud, nor to decry that the new demographic is being attracted by economic opportunity. New demographics have been attracted by economic opportunity to settle in Boston at least since John Winthrop, followed by Irish, Jewish, Italian, Syrian, Polish, Caribbean, Puerto Rican, Brazilian, and Haitian arrivals – and that is good.

MIT has an obligation to recognize the reality that these new factors mean that the future will be different than the past, that housing prices in and near Cambridge will continue to rise, and that MIT is a big part of the reason that is

occurring. I believe that, at a minimum, MIT has an obligation to shield its graduate students and postdocs from the rising prices by providing one hundred percent on- or near-campus affordable housing for MIT grads and postdocs.

The primary reasons this policy makes sense include:

MIT has an obligation to recognize the reality that these new factors mean that the future will be different than the past, that housing prices in and near Cambridge will continue to rise, and that MIT is a big part of the reason that is occurring. I believe that, at a minimum, MIT has an obligation to shield its graduate students and postdocs from the rising prices by providing one hundred percent on- or near-campus affordable housing for MIT grads and postdocs.

1) MIT is uniquely reliant on graduate student and postdoc researchers who create the research that makes MIT special;

2) The most economical way to provide additional housing is to build for the grad student needs.

There have been proposals recently that the way to ease the housing shortage in Boston is to build micro units (small units, with no expensive off-street parking). These proposals leave many observers in doubt as to the lasting market for such housing, questioning how long the new settlers will want to stay in such units. The one group who provide a long-term reliable demand for such units is the graduate students who come for two-to-five years, and will value the walk to university convenience if the units are well located at or near campus. By taking responsibility to provide one hundred percent of the units required by its own grad students, MIT can secure a housing resource for this essential and growing component of the MIT education and research community, and simultaneously reduce one of the factors causing the housing shortage to the detriment of the wider community.

It takes three components to get housing built – land, zoning permission, and money. MIT has land on and near campus; money in its endowment, in part because of the increasing in value of its Cambridge real estate providing some of the technology growth; and the Cambridge City Council has approved the

MITIMCo petition for a major increase in zoning density in and near the MIT campus.

Though some MIT graduate students may prefer to live off campus, the evidence of unmet need is clear.

1) According to former MIT Director of Planning Bob Simha, there were over 1000 units of graduate student housing ready to go when MIT decided to stop pursuing a goal of housing 50% of its grad students on or near campus. Out of the 5000 graduate students and postdocs estimated to not have on- or near-campus housing, I do not believe that there is any serious question that if those units had been built (at more affordable construction cost than available today) the units would have been filled with students pleased to get them.

2) Of those students who prefer to not be on campus, the near campus option would likely be attractive, if the price were affordable. If MIT were to build a mixture of market micro units with graduate students in its planned high rise structures near Kendall Square, that would not feel like undergraduate dorms on campus.

3) More fundamentally, asking today's grad students, conditioned to today's options and prices, how they would

respond to more on-campus housing does not give a good indication of how future grad students, facing a much tighter and more expensive housing market will respond.

There are also criticisms of the one hundred percent strategy from the (non-MIT) Cambridge community, who argue that they have no sympathy for the plight of MIT grad students, and would prefer to see MIT contribute to building affordable housing for families in Cambridge. I have three responses to that:

1) Charity begins at home. If MIT will not provide reasonably for the needs of an essential part of its own community, it is unlikely to fund more than tiny, token amounts of affordable housing for others.

2) Building for the 5000 unserved members of its grad student and postdoc community is the most cost effective way to add housing units and removes a significant amount of competition from the limited supply of available housing.

3) I would love to see MIT recognize that the economic success in Kendall Square which it is proud to have contributed to has had the effect of increasing pressure on the housing supply, so there is a moral obligation for MIT to help with affordable housing in Cambridge over and above its obligation to provide for its own graduate students.

Finally, I want to return to the issue of the large but finite amount of land which MIT controls. I believe that MIT needs to have a serious plan showing how it can provide adequately for its core responsi-

plan to fully meet its educational and grad student housing responsibilities, and in addition provide for some partnerships with the private sector through the use of land near Kendall Square at

There are also criticisms of the one hundred percent strategy from the (non-MIT) Cambridge community, who argue that they have no sympathy for the plight of MIT grad students, and would prefer to see MIT contribute to building affordable housing for families in Cambridge. I have three responses to that: 1) Charity begins at home. If MIT will not provide reasonably for the needs of an essential part of its own community, it is unlikely to fund more than tiny, token amounts of affordable housing for others.

bilities to provide space for teaching, laboratories, libraries, and housing, before entering any more agreements with the private sector to commit its land resources to non-MIT activities.

According to Bob Simha, MIT committed to HUD that the land near Kendall Square would remain in university use, as part of the Kendall Square plan. There is a moral obligation to keep your commitments. I have no objections to high density, and if MIT can produce a

much higher densities, that could be a reasonable outcome. But before any further commitment of MIT land resources to private activities there should be a serious financed plan to provide first for MIT's educational and student housing responsibilities. ■

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**Status of MIT Postdoctoral Researchers**  
Canizares, et al., from page 1

is also a trainee population, on an educational path for one of many possible future careers. Since postdocs do not receive a degree from MIT, it has been important to define this trainee status and associated implications. As stated at [web.mit.edu/mitpostdocs/advisory.html](http://web.mit.edu/mitpostdocs/advisory.html):

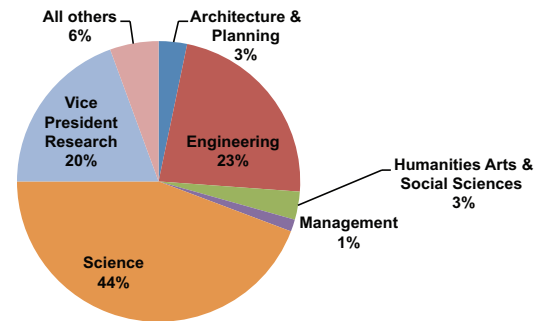
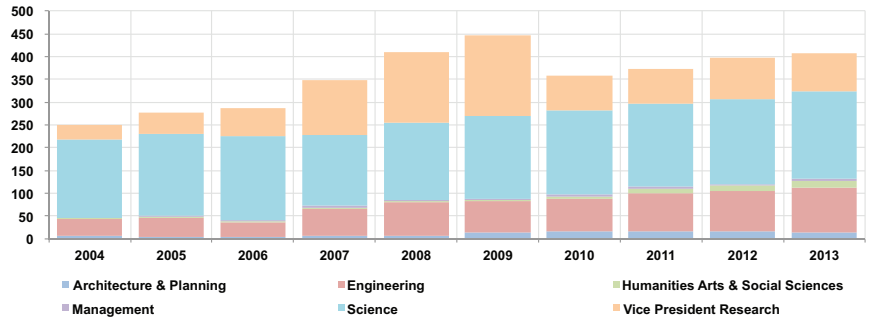
*“The postdoctoral training period at MIT is part of the education of a researcher in STEM and other fields. This notion is in accord with MIT policy stating ‘Postdoctoral associates come to MIT to develop their scholarly competence, working under the supervision of MIT faculty members.’ While no degree is offered, this period is nonetheless integral to preparation for a future independent research career. Thus, a postdoctoral scholar is not invited to join a group at MIT simply to perform a specific research project, rather, a broad training program should be in place.”*

Postdocs may enter academia, but many will find future employment in non-academic arenas, and career preparation and guidance can help postdocs identify the appropriate path for them. A key challenge has been to address salary and benefits which may vary across the population dependent on mechanism of support and field. Postdoctoral affairs have oversight of the Vice President for Research (VPR). Over the past few years, issues of interest to MIT postdocs have been addressed by the VPR’s Office of Postdoctoral Affairs, in conjunction with the newly formed MIT Postdoctoral Association (PDA). Here, we discuss the present status of postdocs at MIT, highlighting positive changes and discussing some remaining challenges.

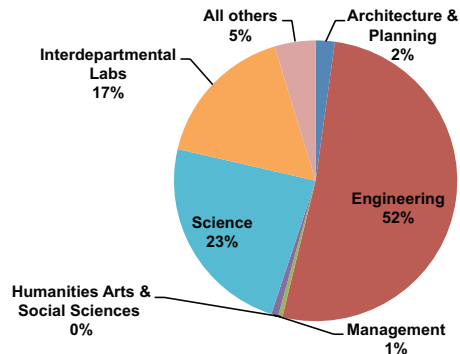
**Who is a postdoc?**

There are ~1,400 postdoctoral researchers at MIT. While the number of Science postdocs has remained relatively constant over the past decade, the number of Engineering postdocs has more than doubled in this same period (Figure 1). The stipend of

**Figure 1**  
**Postdoctoral Fellows**



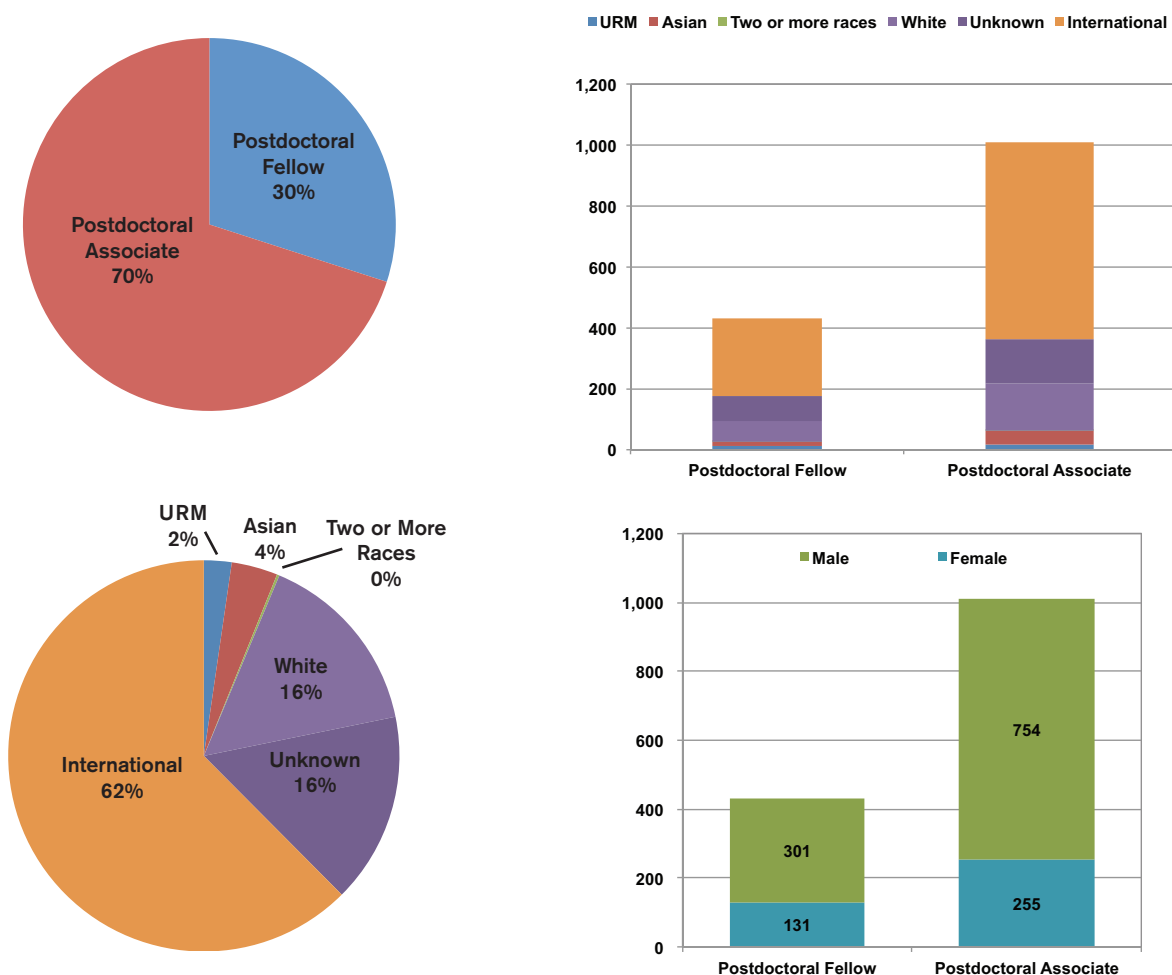
**Postdoctoral Associates**



“Postdoctoral Fellows” is paid from a sponsored award or private foundation but the majority are “Postdoctoral Associates”

(Figure 1) where salary is paid from the advisor’s research grant.

Figure 2



MIT postdocs form a complex population, with more than 60% international and 27% women (Figure 2). Postdocs are typically in their late 20s and early 30s (Figure 3, next page) reflecting extensive earlier education. Unlike the graduate training period, postdocs spend a variable time at MIT. The great majority stays for two or fewer years although the period can extend to five or more years (Figure 4, next page), especially in the Life Sciences, where experiments can be lengthy and employment opportunities are competitive. However, the postdoctoral training period is not intended for long-term appointments, and extends for four years, but in special cases may be extended to a fifth year with Senior Officer approval. Extensions past the fifth year are no longer granted.

### Meeting challenges faced by the postdoc population

A 2011 Postdoctoral Life Survey ([web.mit.edu/IR/surveys/pdf/Postdoctoral\\_Life\\_at\\_MIT\\_Report\\_June\\_2011.pdf](http://web.mit.edu/IR/surveys/pdf/Postdoctoral_Life_at_MIT_Report_June_2011.pdf)) demonstrated significant satisfaction amongst MIT postdocs, but also uncovered opportunities for improvement in the postdoctoral experience. These fell into two broad categories: training and personal resources. Many of these have been addressed by the former and present VPRs. Following the survey, the MIT Postdoctoral Association was launched by the postdocs, and this group has prioritized remaining opportunities for improving the postdoctoral experience. A Faculty Postdoc Advisory Committee was set up in 2012 with the goal “to advise the VPR and the PDA on issues relevant to

the training of MIT postdoctoral researchers.”

### Improving postdoc training

Having invested heavily in research training, members of the postdoc population are at a crucial point in the career trajectory. Each is deciding whether to follow a research track in the future and if so, whether to apply his/her skills to academic or non-academic paths, or whether to go down a different path. These considerations underscore the importance of mentorship and career planning during postdoctoral training.

To take the trainee status of postdocs into account, the postdoc and faculty advisor are now requested to define train-

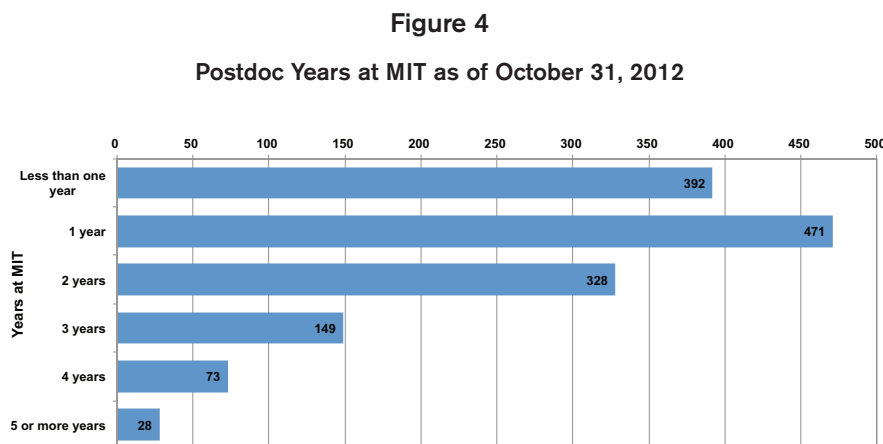
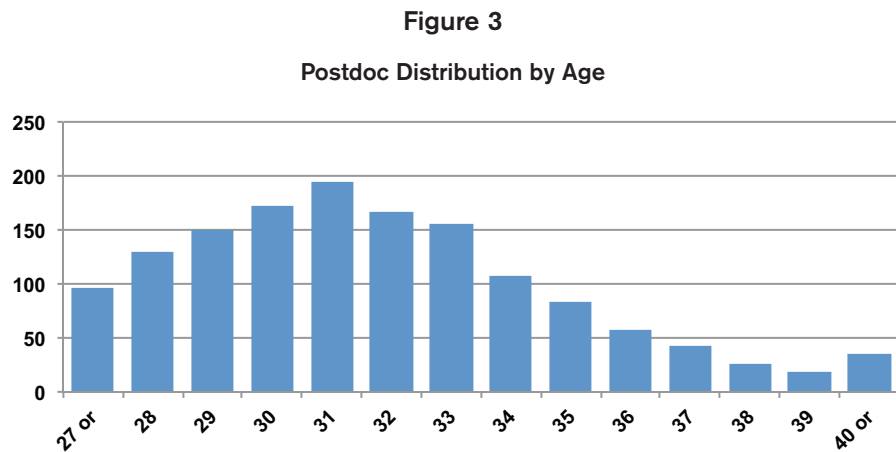
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**Status of MIT Postdoctoral Researchers**  
Canizares, et al., from preceding page

ing goals for each new postdoc. A formal training plan is required as part of a postdoc fellowship application to Federal and many private funding agencies, and guidance for writing such a plan is provided on the VPR Website. Annual performance reviews for postdocs have been in place at MIT for several years, and serve as an important mechanism to guide postdoc trajectory. Suggested simple review forms are available online: [web.mit.edu/mitpostdocs/advisory.html](http://web.mit.edu/mitpostdocs/advisory.html). This review (typically 30 minutes) helps determine whether the goals of a postdoc seem realistic and also benefits the faculty advisor, who obtains a record of postdoc performance and assessment.

The short time that most postdocs are at MIT and the local appointment of a postdoc to a research group rather than centrally to a department or unit can make it challenging for postdocs to feel part of the Institute, and to have a “voice” in Institute affairs. The recently formed MIT Postdoctoral Association ([pda.mit.edu](http://pda.mit.edu)) advocates for postdocs, builds community, offers travel grants and career workshops. Through efforts of the VPR and PDA, postdocs are now represented on multiple MIT committees. Some departments have specific postdoc representatives who may be faculty or staff members, coordinating career information and other activities.

Postdocs follow a multitude of important career paths. Many will enter academia as new professors, but many will not due to personal interests or the number of openings relative to the postdoc population. Many will enter the private sector, for example in energy, computational, biotech, or pharmaceutical industries, others will be entrepreneurs in “startup” companies, or will enter consulting, financial, or management professions. International postdocs frequently return to their home countries to make use of the excellent skills learned at MIT. Many postdocs become teachers anywhere from “K-20.”



The MIT postdoc population is extremely important, as postdocs perform much of the groundbreaking research at the Institute . . . .

Interesting opportunities are emerging since online education and MOOCs require highly skilled production and teaching staff. Postdocs note that many departments do not offer teaching experience. In the Biology Department, six unit seminars offer specialized material to small groups of upperclassmen and valuable teaching experience to postdoc instructors. Adding similar teaching opportunities in departments where this is not typical seems feasible, depending on salary constraints and support of the advisor. One idea under discussion is whether to offer postdocs the opportu-

nity to obtain K-12 teacher certification, as is offered for students ([education.mit.edu/classes/overview](http://education.mit.edu/classes/overview)). A non-research-based funding source would be necessary for the time devoted to this training.

If postdocs are to be properly guided along this diversity of career paths, detailed career information and networking opportunities are needed. In some fields faculty members do not have the expertise to guide a postdoc in his/her group into non-academic career tracks. In response to this need, many workshops and seminars are organized by the VPR



office, the PDA, Schools and departments, and by neighboring universities and organizations. A postdoc can join one or more mailing lists to tap into this information stream. To further assist in professional development at MIT and beyond, MIT postdocs now have access to Career Office services, and to the Writing Center. The VPR sponsors postdocs to participate

by the VPR on the NIH pay scale with the commitment that this salary increases yearly. Most MIT postdocs are now appropriately compensated.

A second concern has been the disparity in benefits between Fellows and Associates. Associates are categorized by IRS regulations as employees with attendant benefits, and Fellows are not. Thus,

The efforts over the past several years have improved both the training and compensation of postdoctoral researchers at MIT. . . . these efforts acknowledge the ways MIT postdoctoral training is used around the world to good effect.

in the “Path of Professorship” workshop run by the Office of the Dean for Graduate Education. As fits the extensive experience of postdoctoral trainees, it is expected that the postdoc will take a very active role in considering career paths and in accessing and acting on relevant information. Postdocs have recently been able to obtain Associate Alumni status, acknowledging their membership in the MIT academic community and allowing access to alumni networks.

#### *Personal resources*

There have been two major concerns with regard to compensation and benefits of postdocs. The first has been to ensure that all postdocs are paid a minimum salary commensurate with their level of education. This has been strongly encouraged

despite the prestige of being awarded a postdoctoral fellowship, health care and other benefits are not automatically paid. Support for Fellows does not contribute to the MIT benefit pool for the range of support and services that are included in support for Postdoctoral Associates. Recent communication from the VPR has recommended that faculty compensate Fellows to allow equitable health insurance benefits relative to Associates. Gym membership, previously more costly to Fellows, has now been equalized, a popular move as evident in a membership jump. Retirement benefits remain open to Associates only. Due to fellowship duration, a Postdoctoral Fellow may later become an Associate and vice versa, requiring careful bookkeeping.

The postdoctoral period occurs at a time when postdocs may be starting families, adding financial, organizational and, for women, biological challenges. Support for childcare subsidies is another desire by the postdoc community. For female postdocs bearing children, FMLA grants an eight-week maternity leave that has been extended to three months in some groups and departments. We would recommend this duration across the Institute for Associates and Fellows, when fellowship terms permit.

#### **For the future**

The efforts over the past several years have improved both the training and compensation of postdoctoral researchers at MIT. Together, these efforts acknowledge the important mission of the Institute in the postdoctoral training period. They also acknowledge the pivotal role that postdocs play in research success at MIT, and the ways MIT postdoctoral training is used around the world to good effect. Challenges remain for the future, but mechanisms and commitment are in place to ensure that MIT remains a premier institute for postdoctoral training and outcome. ■

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**Claude Canizares** is former Vice President for Research, present Vice President and Professor of Physics ([crc@mit.edu](mailto:crc@mit.edu));

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## Doctoral Education Outcomes and Impact

Christine Ortiz

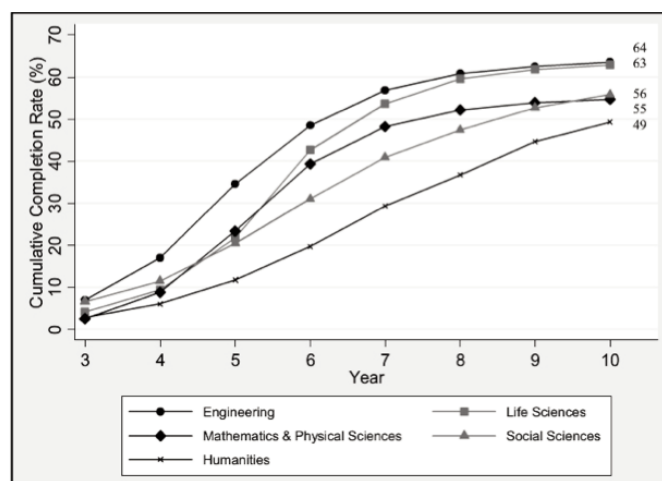
### DOCTORAL EDUCATION AT MIT

dates back 100 years, is central to the mission of MIT and vital to maintaining competitiveness and leadership as a world-class research university. MIT currently has a doctoral population of the 3843 currently enrolled doctoral students, of whom 42% are international, 31% are female, and ~11% are underrepresented minority (of U.S. citizen and permanent resident) (Source: Office of the Provost/Institutional Research). Doctoral education at MIT maintains elements of the classical apprentice model including a core of high quality thesis research, as well as, often, formal coursework and the immersion of students in a rich environment of co-curricular learning opportunities (e.g., international experience, entrepreneurship, public service, etc.).

A number of recent national and international reports have questioned the effectiveness of the current state of doctoral education and called for its reform to better prepare graduate students who are more often pursuing a diversity of career pathways outside of academia (see: *Research Universities and the Future of America*, National Academies of Sciences, 2012; *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*, National Academies of Science, 2012; *Pathways Through Graduate School and Into Careers*, Council for Graduate Schools, 2012; *Doctoral Degrees beyond 2010: Training Talented Researchers for Society*, League of European Research Universities). Examples of recommendations from these reports include: broadening the focus of graduate education to enhance

the development of twenty-first century professional skills and career development, expanding collaborative relationships with employers such as internships, improving completion rates, and shortening time-to-degree.

In light of these ongoing debates, here we review data available on doctoral education outcomes and impact. While such data are provided as a starting point for discussion, it is with the understanding that these are wholly insufficient to describe the full richness of the doctoral education experience and all of its nuances, and the fact that such data will and should vary greatly with the corresponding large diversity of the disciplines. A follow-up discussion on the challenges and future of understanding doctoral education outcomes and impact is provided at the end of this article.



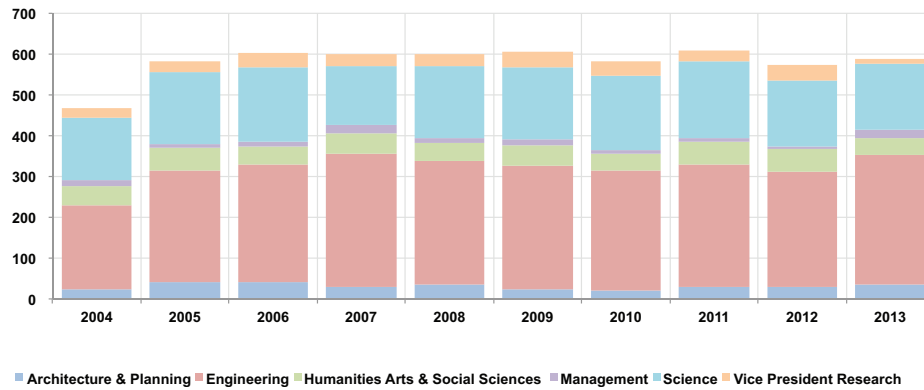
**Figure 1. Survey of Selected U.S. Universities: Cumulative PhD Completion Rates by Broad Field Covering 1992-93 through 2003-2004. (Source: *Ph.D. Completion and Attrition: Analysis of Baseline Demographic Data from the Ph.D. Completion Project: Council of Graduate Schools, 2008.*)**

### Completion, Attrition, and Time-to-Degree

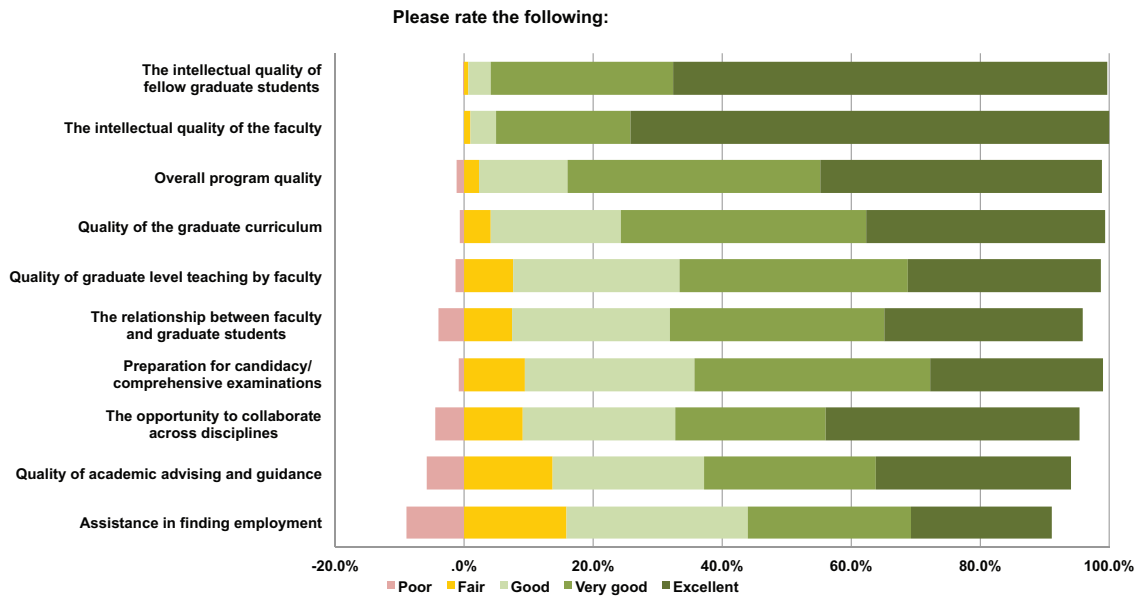
Doctoral completion, attrition, and time-to-degree for a sampling of U.S. universities by broad field and covering 1992-93 through 2003-2004 are shown in Figure 1 (*Ph.D. Completion and Attrition: Analysis of Baseline Demographic Data from the Ph.D. Completion Project: Council of Graduate Schools, 2008*). Such data are collected at MIT ([web.mit.edu/ir/pop/students/doctoral\\_completions.html](http://web.mit.edu/ir/pop/students/doctoral_completions.html)) and analyzed at the program level as well as disaggregated by gender, ethnicity, and international/domestic status.

### Doctoral Degrees Awarded

Our doctoral alumni are leaders in industry, academia, business, and community and social organizations across the world, contributing enormously to the betterment of our planet and society. MIT tracks doc-



**Figure 2. MIT Doctoral Degrees Awarded Between 2004 and 2013 (Source: Office of the Provost/Institutional Research. Detailed data can be found on the Website of the Office of the Registrar: [web.mit.edu/registrar/stats/degrees/index.html](http://web.mit.edu/registrar/stats/degrees/index.html).) Vice President for Research includes Health Science and Technology and Operations Research.**



**Figure 3. Doctoral Student Satisfaction with Various Aspects of Graduate Education as Reported in the 2013 Doctoral Student Exit Survey (<https://web.mit.edu/ir/surveys/docexit.html>). Exiting doctoral students were asked “Please rate the following aspects of your doctoral program?” Percentages of respondents that indicated poor, fair, good, very good, and excellent are reported. (Source: Office of the Provost/Institutional Research.)**

toral degrees awarded as shown in Figure 2. For the 2012-2013 academic year, MIT awarded 587 doctorates, of which 55% were within the School of Engineering, 26% within the School of Science, 7% within the School of Humanities, Arts, and Social Sciences, 6% within the School of Architecture and Planning, and 6% within the Sloan School of Management.

**Employability, Salary, and Professional Activities of Doctoral Alumni**

The 2012 Graduate Alumni Survey ([web.mit.edu/ir/surveys/grad\\_alum.html](http://web.mit.edu/ir/surveys/grad_alum.html);

[web.mit.edu/fnl/volume/254/ortiz.html](http://web.mit.edu/fnl/volume/254/ortiz.html)) shows that 97% of doctoral alumni respondents report that they are currently working, doing a postdoctorate, or in military service, with only 2% seeking employment. Though the doctoral degree has historically been considered as a main pathway to academia, 54% of doctoral alumni reported that their employer is non-academic: governmental (5.6%), industry (38.8%), not-for-profit (3.7%), other organization (1.6%), or self-employed (4.7%).

21% of doctoral graduate respondents

said that they have founded a company and 41% indicated that they held at least one patent. The median annual income (without bonuses) of an MIT doctoral recipient was determined to be \$112,500. For those going into academia, a new pilot project between MIT and Academic Analytics, Inc. ([www.academicanalytics.com](http://www.academicanalytics.com)) is currently being carried out to assess the scholarly productivity of our doctoral graduates, as one measure of knowledge generation and dissemination. Academic

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**Doctoral Education Outcomes and Impact**  
Ortiz, from preceding page

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Analytics maintains a national database of scholarly productivity which is collected by independent sources and includes 170,000+ faculty members, 282 institutions, 8737 PhD programs, one million+ articles and 10 million+ citations, 75,000+ grants for six federal agencies, 26,000+ honors from 281 governing societies, and 56,000+ books.

### Graduate Student Satisfaction

The 2013 Graduate Alumni Survey ([web.mit.edu/ir/surveys/grad\\_alum.html](http://web.mit.edu/ir/surveys/grad_alum.html)) indicated that 92% of doctoral alumni report being somewhat or very satisfied with their time as a graduate student at MIT, with 89% of doctoral alumni rating their academic experience as very good or excellent. These results were consistent with the 2013 Doctoral Student Exit Survey (<https://web.mit.edu/ir/surveys/docexit.html>), whereby 91% said they were somewhat or very satisfied and 86% rated the quality of their overall academic experience very good or excellent (detailed breakouts are provided in Figure 3). Figure 3 also demonstrates areas where there is opportunity for improvement.

### Finances

Currently, 89% of doctoral students receive full tuition support through MIT and external sources. In the 2013 Doctoral Student Exit Survey (<https://web.mit.edu/ir/surveys/docexit.html>), 86% of respondents reported that they will have no debt directly related to their graduate education when they receive their doctoral degree, and 78% of respondents will have no undergraduate debt. (Source: Office of the Provost/Institutional Research.)

### Measures of Learning Outcomes

In the fall of 2013, each graduate program developed student learning objectives and assessment plans that included: 1) A list of learning goals, proficiencies, aspirations and expectations for their graduates, 2) A plan for the collection of systematic evi-

dence, including indirect and direct measures, and 3) A plan for further action based on this collected data. Many measures were cited in addition to those described above, including: core class performance, oral and written qualifying examinations, annual progress reports, publications, portfolios and other examples of knowledge generation and dissemination, awards and honors, teaching requirements and evaluations, performance in responsible conduct of research courses, and exit interviews. A number of common themes in the learning objectives emerged across many graduate programs: communication, ethics, and other transferable skills. Lastly, numerous interesting programmatic components were cited such as: workshops on fellowship and research proposal writing, a leadership elective, various minor programs, a job market and preparation workshop series, ethics seminars, and an annual retreat featuring distinguished speakers from outside of MIT both in academia and industry.

### The Challenges and the Future

In this article, a summary of the most recent data on doctoral education outcomes and impact is provided and available to graduate programs. As mentioned in the Introduction, these data are insufficient to describe the full richness and often nonlinearity of the doctoral education experience, as well as the great creativity and significant accomplishments of our doctoral students. National discussions on assessment of undergraduate education highlight the shortfalls of overly prescriptive, solely quantitative direct measures – the same is true at the graduate level.

As we look to the future, doctoral evolution is evolving beyond frontier knowledge generation, to include an understanding of new knowledge in a broader context and the development of a broader skillset to apply new knowledge for the benefit of humanity. There is an opportunity to enhance and better understand and value the outcomes of co-curricular aspects of doctoral education at

MIT (e.g., international experience, entrepreneurship, public service, etc.) which contribute significantly to the quality and depth of students' educational experience, personal and professional development, and are not captured in the data described above. A recent report by the *MIT Task Force on Graduate Student Professional Development* ([odg.mit.edu/about/committees/sponsored-by-odg/tfpro](http://odg.mit.edu/about/committees/sponsored-by-odg/tfpro)) outlines a framework of desirable skillsets for our graduates (i.e., ethics, communication, teaching/coaching/mentoring, critical thinking, personal development, leading, and working with others) and recommends integrating this framework as an essential part of our educational mission. Additionally, discussions of quality, impact, and outcomes should reflect the increasing diversity of meritorious knowledge dissemination methods (see: "What constitutes merit?" C. Ortiz, [resources.mit.edu/letter/what-constitutes-merit](http://resources.mit.edu/letter/what-constitutes-merit)).

Lastly, the report of the *Task Force on the Future of Graduate Education in the Context of MITx* ([odg.mit.edu/about/committees/sponsored-by-odg/future-grad-ed](http://odg.mit.edu/about/committees/sponsored-by-odg/future-grad-ed)) provides numerous ideas for the use of technology to enhance residential graduate education, for example, developing: advanced teaching assistant training to increase levels of expertise and proficiency in digitally based pedagogies, tools, and assessment; collaborative, graduate level global geographically distributed residential courses; new platforms for graduate student training in twenty-first century research skills; and experiments in publication media and formats.

The author would be happy to receive comments at [cortiz@mit.edu](mailto:cortiz@mit.edu) and would like to thank the Office of the Provost/Institutional Research for assistance with the content of this article and the Office of the Dean for Graduate Education Faculty Advisory Board for review and commentary on a draft of this article. ■

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## The Alumni Class Funds Seek Proposals for Teaching and Education Enhancement

**THE OFFICE OF FACULTY SUPPORT** is requesting proposals for projects for the 2014-2015 academic year that improve the quality of teaching, enrich students' learning experiences, and uphold the tradition of innovation at the Institute. The Alumni Class Funds are comprised of gifts from the classes of 1951, 1955, 1972, and 1999.

Over the past 15 years, more than 150 projects were made possible through the

generous assistance of The Alumni Class Funds. These projects have had substantial impact on education both inside and outside MIT. Grants typically range from \$10,000 to \$50,000 and cover a wide variety of creative curricular and pedagogical projects. Larger scale projects will also be considered, as well as project renewals and multiple year projects, but funding commitments will be made on a year-by-year basis.

Proposals are due on Friday, January 31, 2014. Guidelines, forms, instructions, and descriptions of previously funded projects can be found at [web.mit.edu/alumnifunds](http://web.mit.edu/alumnifunds). Please contact the Office of Faculty Support at 617-253-6776 or [alumnifunds@mit.edu](mailto:alumnifunds@mit.edu) for more information. ■

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## The MIT Giving Tree



**THE MIT PUBLIC SERVICE CENTER** (PSC) has been a catalytic force in the lives of tens of thousands of undergraduate and graduate students over its 25 years on campus. The PSC has supported student service not only in communities around the world, but also in the Institute's backyard throughout neighborhoods in Cambridge and Boston. While we build a more caring MIT community, let us also

remember to demonstrate caring in our local communities by supporting the children and families that live and work among us.

With that in mind, the winter can be challenging for local families as nearly 30 percent of children in the Boston Metro area live in low-income families. Many of these 30,000 children may not receive gifts or possess the winter clothes they need to fully enjoy this season. Since 1992, the PSC has hosted the annual MIT Giving Tree to help provide gifts for these local children.

The PSC works with 12 local organizations (such as Horizons for Homeless Children) that support Greater Boston-area families and children experiencing homelessness or other stressful situations. Last year, the MIT community provided

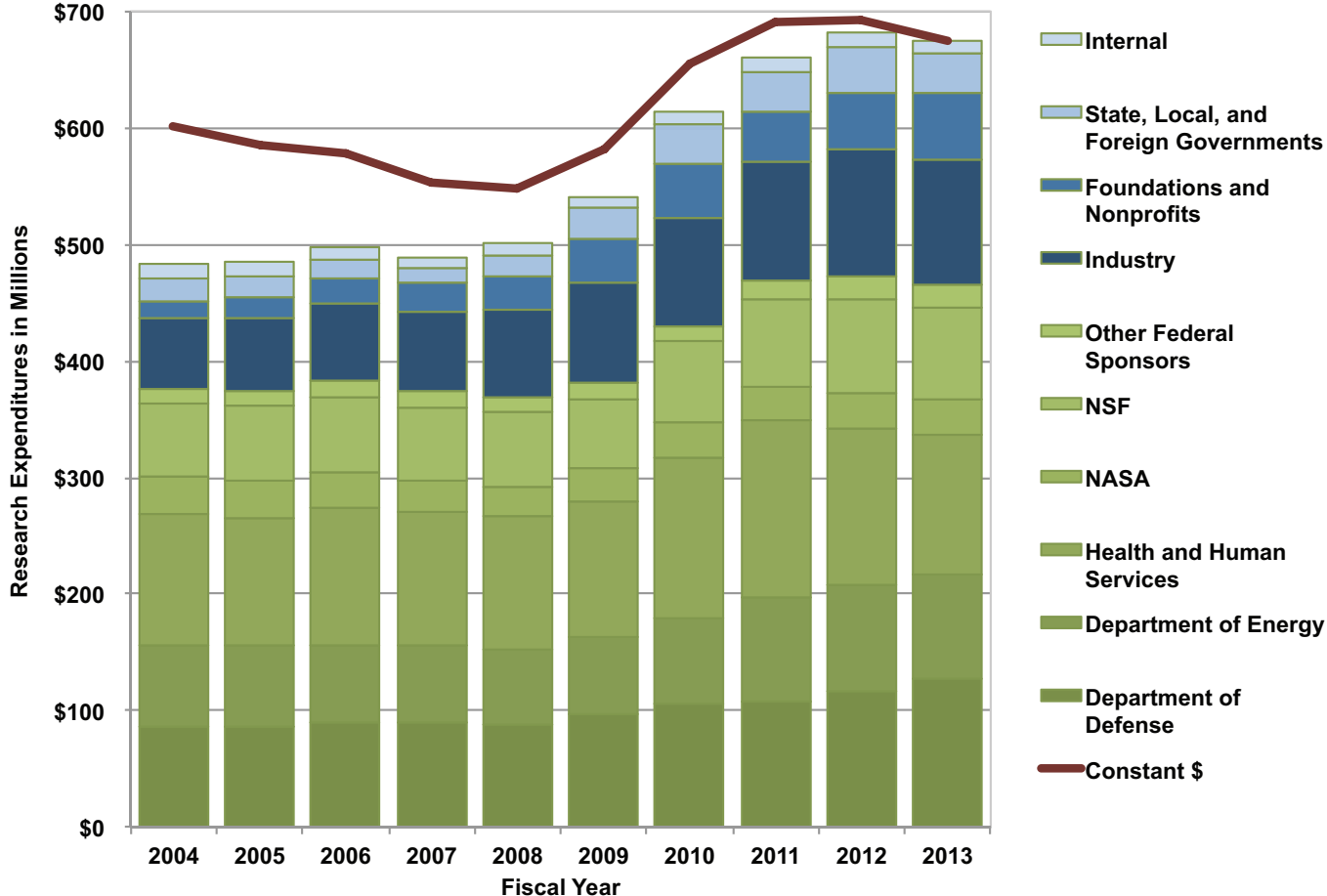
gifts to over 500 local children, and this year we are looking to significantly increase our impact through faculty and staff support. By participating, members of the MIT community can extend our ethic of caring to local children and families beyond the Institute.

The MIT Giving Tree kicks off before Thanksgiving Break, and the PSC will collect gifts from November 25 to December 16. You can sponsor a child's gift request individually or participate in a group with friends or co-workers. You can work in teams of any size to purchase one gift or 20!

Please e-mail [mitgivingtree@mit.edu](mailto:mitgivingtree@mit.edu) or stop by the PSC office (4-104) for more information or to sign up to sponsor a gift. ■

M.I.T. Numbers

Campus Research Expenditures By Major Sponsor\*



\*Excludes the Broad Institute

Source: Office of the Provost/Institutional Research