

I. Introduction

For more than a century, Ph.D. education has been one of the great strengths of Columbia University. Columbia was a pioneer in doctoral education, opening one of the first Ph.D. programs in the United States in the 1870s. Since then it has trained some of the country's ablest educators and researchers.

While Columbia's Ph.D. programs remain among the most outstanding in the country, they have in recent decades faced multiple challenges, including growing competition from other universities for the best graduate students, the need to develop stronger mechanisms for funding their students and the ever-present challenge of adapting their curricula to the rapidly changing nature of human knowledge. In response, the University has made important changes in the size, scope and funding of its Ph.D. programs, their curricula and the support services provided to their students. Additional enhancements are under active consideration.

The University's accreditation review represents an excellent opportunity to conduct a self-examination of the effectiveness of the changes already implemented and those contemplated and to obtain the advice of colleagues involved in doctoral education at other universities. Columbia, therefore, has chosen to take advantage of the flexibility offered by the Commission on Higher Education of the Middle States Association of Colleges and Schools to conduct a focused review on Ph.D. education. To demonstrate its compliance with the

Commission's fourteen standards of accreditation, the University assembled a body of relevant documents that was reviewed by a team of evaluators on November 3-5, 2005.

The preparations for the University's accreditation review have been guided by the Provost of the University, Alan Brinkley, with the assistance of a twelve-member Steering Committee that he has chaired. The other members¹ are:

Paul Anderer, Wm. Theodore and Fanny Brett de Bary and Class of 1941 Collegiate Professor of Asian Humanities; Associate Vice President for Academic Planning and Global Initiatives

Elizabeth Blackmar, Professor of History

Richard Clarida, C. Lowell Harriss Professor of Economics and Professor of International and Public Affairs

Robert Harrist, Jane and Leo Swergold Professor of Chinese Art History

Stuart Firestein, Professor of Biological Sciences

Morton Friedman, Professor of Civil Engineering and Engineering Mechanics and of Applied Physics and Applied Mathematics; Vice Dean of the Fu Foundation School of Engineering and Applied Science

Letty Moss-Salentijn, Dr. Edwin S. Robinson Professor of Dentistry (in Anatomy and Cell Biology); Associate Dean for Academic Affairs of the College of Dental Medicine

Gerald Navratil, Thomas Alva Edison Professor in the Faculty of Engineering and Applied Science

¹Richard Kessin, Professor of Anatomy and Cell Biology, also served on the Executive Committee until resigning as the Associate Dean for Graduate Affairs of the College of Physicians and Surgeons and going on leave.

Henry Pinkham, Professor of Mathematics; Dean of the Graduate School of Arts and Sciences

Virginia Papaioannou, Professor of Genetics and Development

Stephen Rittenberg, Senior Vice Provost

In Spring 2004, the Steering Committee formulated the questions that guided the University's evaluation of its Ph.D. programs, determined the charges of the subcommittees that would investigate them and oversaw the preparation of the University's Self-Study Design by the Office of the Provost. The University submitted the Self-Study Design, which may be found on the web at <http://www.columbia.edu/cu/provost/midstates/docs/SelfStudyFinalAdobe.pdf>, to the Middle States Commission on Higher Education in July 2004.

The Steering Committee distributed the work of reviewing the Ph.D. programs among four subcommittees: Curriculum and Training, Mission and Assessment, Organization and Resources, and Student Services. The full charges of the subcommittees can be found in the Self-Study Design. Their essential elements, as summarized below, identify key issues before the University as it seeks to enhance the quality of the doctoral education it offers. In conducting its own review of our Ph.D. programs, we would ask the external visiting team to consider the questions raised in the subcommittee charges and to provide us with advice on how they can be most effectively answered.

The *Subcommittee on Curriculum and Training* focused on how well the structure of the Ph.D. curriculum prepares students to pursue careers in their chosen fields. It asked if the

requirements the students must fulfill ensure that they receive a rigorous education and if they represent realistic expectations, given the time and resources available to the students. One of the requirements common to most of the Ph.D. programs is that their students engage in teaching as part of their studies. The Subcommittee considered whether there should be greater uniformity across all of the programs with respect to this requirement, how it affects the time needed to complete the degree and if the students receive adequate training before entering the classroom. Additionally the Subcommittee looked at how effectively the faculty mentor their doctoral students.

The *Subcommittee on Mission and Assessment* examined the mission statements of both the University and the Graduate School of Arts and Sciences and asked if they provide the direction the University will need in the coming decade to maintain the excellence and competitiveness of its Ph.D. programs. Additionally it evaluated the means the University employs to measure student learning in the Ph.D. programs and how effective those measurements have been in promoting learning.

The manner in which doctoral students in many programs are funded has changed in recent years. The *Subcommittee on Organization and Resources* considered whether those changes have achieved their stated purposes and whether additional modifications are desirable. It also considered the organizational issues arising from the fact that even though every Ph.D. program is offered through the Graduate School of Arts and Sciences, the School does not directly administer and control all of them. Specifically, it asked if differences between the programs in and outside of the Arts and Sciences create variations in their quality or issues of

equity in how the students are treated. The Subcommittee was also asked to assess whether the powers and resources assigned to the Dean of the Graduate School are appropriate for the role he is expected to perform with respect to the programs both within and outside of the Arts and Sciences. A final part of the Subcommittee's charge was to consider if there are organizational barriers to promoting interdisciplinary programs at the University and, if so, how they can be eliminated.

Over the past decade, the University has also materially upgraded the support services Ph.D. students receive. The *Subcommittee on Student Services* considered the state of those services and identified areas where additional attention may be needed. Although the scope of its mandate covered the full range of Ph.D. student services, the Subcommittee chose to focus on housing, health, career services and international student services. Student perceptions of the environment in which they live and study are a critical measure of the effectiveness of the services they receive. As part of its work, the Subcommittee also evaluated how the University measures levels of student satisfaction with those services and uses the information it collects to improve them.

The four subcommittees were formed in Fall 2004. Each was chaired by a member of the Steering Committee and consisted primarily of members of the faculty. Each also included Ph.D. students nominated by GSAC (the Graduate Student Advisory Council). GSAC is an elected body with representation from each of the University's Ph.D. and M.A. programs. Its goal is "to facilitate communication between graduate students and the administration and to improve the quality of graduate student life." A list of the individuals originally appointed to the

subcommittees is available through the web site the University has created for the accreditation review at <http://www.columbia.edu/cu/provost/midstates/midstateindex.html>. Over the course of the review, some members withdrew due to competing responsibilities or leaves.

The subcommittees completed their work by the end of the Spring term of 2005. Using their analyses, the Office of the Provost prepared a draft of this document which has been widely circulated for comment, first from the members of the Steering Committee and then from other committees and individuals with a role in Ph.D. education at Columbia. These include the Executive Committee of the Graduate School of Arts and Sciences, the Education Committee of the University Senate, deans, department chairs, directors of Ph.D. programs, departmental faculty responsible for overseeing the studies of Ph.D. students and the Graduate Student Advisory Council. The self-study was also posted on the web, and the members of the University community were invited to comment on it and, more generally, the University's Ph.D. programs.

The self-study begins with a brief history of Ph.D. education at Columbia and a description of its organization and governance. It then provides an overview of the curricula of the Ph.D. programs, their methods for assessing the learning of their students, and their faculty. The next three sections focus on the Ph.D. students themselves, discussing admissions, the size and composition of Ph.D. enrollments, time-to-degree and attrition rates. Subsequent sections look at the manner in which Ph.D. students are funded at Columbia and at two related parts of the support they receive from the University – housing and medical coverage. A discussion follows of the special services international students receive. The self-study concludes with a

description of the assistance Ph.D. students receive once they enter the job market and an analysis of the positions secured by graduates from the programs between 1994 and 2004.

II. History of Ph.D. Education at Columbia

During its first century, Columbia was a small undergraduate college with limited enrollments drawn almost entirely from New York City's more prosperous Episcopalian families and a fixed curriculum that emphasized Greek and Latin. Other than an early attempt at creating a medical school, which ended unsuccessfully in 1813, it showed little ambition before the 1850s to diversify either the education it offered or the students it taught.

Columbia's character began to change with the opening of a Law School in 1858 and a School of Mines in 1864, both of which quickly surpassed the College in enrollments. Over the next half century, Columbia evolved into a research university, reacquired a medical school, added other professional schools and became one of the country's first universities to offer the Ph.D. In 1896, the Trustees designated Columbia a university, and in 1912, its corporate name was changed to "The Trustees of Columbia University in the City of New York" by order of the State Supreme Court of New York.

Columbia first offered instruction toward the Doctor of Philosophy through its School of Mines in the early 1870s. The School graduated its first Ph.D. student in 1875 and continued to confer the degree through 1892. However, it was quickly supplanted as the center of Ph.D. education at Columbia with the creation of a graduate school, or more precisely, three Graduate Faculties.

In 1880, the University opened the Faculty of Political Science to offer a three-year program of study leading to the Ph.D. It was followed in 1890 by the creation of the Faculty of Philosophy. Two years later in 1892 the faculty in the physical sciences and mathematics were split off from the School of Mines to form the Faculty of Pure Science. These three Faculties correspond to the modern-day division of disciplines within the Arts and Sciences among the Social Sciences, Humanities and Natural Sciences.

Initially, the three Faculties operated independently of one another. Each had its own faculty, dean and curriculum. Starting in 1909, the University designated a single individual to serve as the dean of all three entities. Thereafter, while they retained separate statutory identities, the three Faculties steadily lost their individuality and collectively came to act as one school, called the Graduate School of Arts and Sciences. The University's Statutes finally caught up with institutional practice in 1979 when the Trustees amended them to merge the three Faculties officially into the Graduate School of Arts and Sciences.

Before 1984 the Dean of the Graduate School of Arts and Sciences had responsibilities that went beyond directing its educational programs. In addition, he served as the *de facto* head of a construct of departments and schools that made up the Arts and Sciences, with authority over their appointments and control over their common budget. In 1984 those broader responsibilities were transferred to a new position, the Vice President for Arts and Sciences, and in 1992 the new arrangement was formalized with the creation of a Faculty of Arts and Sciences that now includes six schools – Columbia College, the School of General Studies, the Graduate School of Arts and Sciences, the School of the Arts, the School of International and Public

Affairs, and the School of Continuing Education – and 29 departments. With the appointment of a Vice President, the responsibilities of the Dean were focused on the University's Ph.D. and M.A. programs. This is the organizational arrangement that exists in the Arts and Sciences today.

Ph.D. education spread beyond the disciplines in the Arts and Sciences at an early date. As already noted, the School of Mines, precursor of the School of Engineering and Applied Science, started to offer the degree in the 1870s, before the formation of the Graduate School. The first biomedical Ph.D. program, Microbiology, started in 1893 and was followed by four others by the start of World War I. The Ph.D. program in Business opened in 1916. Table II-1 lists the year in which each of the Ph.D. programs began.

Columbia has played a central role over the last 130 years in the education of the nation's pool of doctorally-trained talent and, through those individuals, has exercised a significant influence over higher education and the conduct of scholarly and scientific research in this country. The University was not only a pioneer in doctoral education. Until World War II, it also had one of the largest enrollments of doctoral students in the country and awarded a disproportionate share of the nation's Ph.Ds.

Starting in the 1890s, the University invested significant resources in expanding its doctoral programs. By 1900, it had more doctoral students than any other university, with two or three possible exceptions. (Good comparative information was not available before 1920.) By 1920, when the National Opinion Research Center began to collect statistics on higher education

nationally, Columbia graduated more Ph.Ds. than any other university, a position it retained until after World War II. Its preeminence as a doctoral institution was particularly strong in the social sciences where it graduated as much as a tenth of all the country's Ph.Ds. in some inter-war years.

Although the University's Ph.D. programs continued to grow after World War II, their share of the country's graduates diminished with the rapid expansion of doctoral education at universities across the country. According to studies by the National Academy of Sciences, Columbia dropped to being the sixth largest producer of Ph.Ds. in the 1960s and the thirteenth by the early 1970s. In 2003, it ranked twenty-first. While its market share has declined in recent decades, Columbia has continued to graduate significant numbers of highly qualified Ph.Ds. in a diverse range of disciplines. Today, many hold appointments at universities and colleges throughout the country and abroad, as demonstrated by the placement statistics discussed in the final section of this self-study. Others have achieved distinction in research institutions, public service, the non-profit sector and the corporate world.

The presence of Ph.D. programs has also played a major role in shaping the character and culture of the University. Their introduction was a milestone in Columbia's evolution into a research university. Throughout the 20th century, moreover, they accounted for a significant percentage of the University's total enrollments. By 1901, the 433 enrollments in the three Graduate Faculties almost equaled the number of undergraduates in Columbia College. Ten years later, they had increased to 1,367, almost 70 percent more than the College, and comprised 34 percent of the total degree enrollments of the University. Thereafter, with the exception of a

brief period in the 1920s, the three Graduate Faculties, and then the Graduate School, continued to have the highest enrollment of degree candidates of any school in the University until the expansion of the College in the late 1990s.

The growth of the Graduate Faculties also altered the demographic background of Columbia's student population, giving it a much more cosmopolitan character. The College continued to draw its students almost entirely from New York City until the 20th century. Even as its catchment area expanded after 1900, the College retained a predominantly New York complexion until well after World War II, with many of its students living at home and commuting to the University. From their start, in contrast, the three Graduate Faculties attracted students from throughout the country. As early as 1891, almost 80 percent were not from New York. That percentage fluctuated thereafter, but Ph.D. students continued to come primarily from outside the greater New York metropolitan area. Most were American citizens, but a growing number were also international.

In 1891, two percent of the enrolled students were from foreign countries. The percentage rose in succeeding decades, reaching more than eight percent by the 1920s, before falling in the next two decades due to the Depression and World War II. Following the end of the war, the percentage started to climb once again, reaching 11 percent by 1971 and taking off thereafter. Today it stands at almost 39 percent, as Graph II-1 demonstrates. Not only were their numbers large, but the University's international Ph.D. students included many who went on to achieve prominence in their own countries or here in the United States. Some, such as

B. R. Ambedkar, the chief author of the constitution of India, and Wellington Koo, a prime minister of China in the inter-war period, became prominent public figures. Many more went on to distinguished scholarly and scientific careers.

Finally, the quality of the Ph.D. programs and the achievements of their graduates have accounted for much of the University's reputation for excellence over the last century. Highly recruited by other universities and colleges, many of its Ph.D. graduates achieved distinction in their professional lives, enhancing, in the process, the reputation of the institution that trained them.

III. Organization and Governance of Ph.D. Education

Columbia offers the Ph.D. in 61 different areas of specialization. One of these, the Ph.D. in education, is given through Teachers College, an affiliated institution of the University. Since the Middle States Commission on Higher Education accredits Teachers College separately from the University, we have excluded the Ph.D. program in education from this review. Among the other 60 programs, 31 are offered through departments or inter-departmental programs within the Arts and Sciences. The rest are organized by other schools, some of which are located on the Morningside campus and the rest at the Columbia University Medical Center.

Distribution of Ph.D. Programs by School

Arts and Sciences	
Humanities	15
Social Sciences	6
Natural Sciences	<u>10</u>
Subtotal	31
Architecture, Planning and Preservation	2
Biomedical Sciences	11
Business	1
Engineering and Applied Science	9
Journalism	1
Public Health	4
Social Work	<u>1</u>
Subtotal	29
Total	60

A complete list of programs is included in Table II-1, ordered chronologically by the years in which they began. Most of the 60 Ph.D. programs are based in individual departments or schools. There are, however, some, such as Cellular, Molecular and Biophysical Studies

(commonly known as the Integrated Program), Chemical Physics, Classical Studies and Theatre, that are directed by doctoral program subcommittees because of their interdisciplinary nature.

Columbia's diverse array of Ph.D. programs has evolved in response to changes in institutional priorities, societal needs, student interest, the demands of the educational marketplace, and the ever-changing nature of knowledge. The faculty regularly review and modify the curricular content, requirements and method of delivery of existing programs. From time to time, the University also broadens its Ph.D. offerings into new fields. Over the past 10 years, the University has added eight new Ph.D. programs in the following fields:

- Biomedical Informatics (1995)
- Neurobiology and Behavior (1996)
- Communications (1997)
- Ecology, Evolution and Environmental Biology (1997)
- Environmental Health Sciences (1997)
- Biomedical Engineering (2000)
- Earth and Environmental Engineering (2000)
- Sustainable Development (2004)

During the same period, two Ph.D. programs have been phased out:

- Film
- Mineral, Metallurgical and Mining Engineering

Program Review

While the intellectual impetus for a new program originates from the faculty, every proposal goes through the same process of institutional evaluation. First, it is reviewed by the Executive Committee and the Dean of the Graduate School of Arts and Sciences. It is then

submitted to the Senior Vice Provost who reviews it on behalf of the Provost and, subject to his approval, forwards it to the University Senate, a deliberative body of 107 members representing all constituencies of the University. The Senate's endorsement represents the final step within Columbia in the creation of a new post-baccalaureate educational program. Once the Senate has given its approval, the Senior Vice Provost submits the proposal to the New York State Department of Education for its evaluation and inclusion in the University's register of approved programs.

The Ph.D. programs within the Arts and Sciences are subject to periodic evaluation as part of a process of review begun in the mid-1980's to look systematically at all of the academic and academic support units in the Arts and Sciences with the goals of assessing their quality and planning for their future development. Since the mid-1990's, the evaluations have been organized and directed by the Academic Review Committee (ARC), a standing faculty committee. Each begins with the unit under review preparing a self-study, which serves as the basis for an evaluation by both a committee of Columbia faculty and an external visiting team. Using their reports and other data it has collected, ARC prepares a final report which the Vice President for Arts and Sciences uses to negotiate a plan with the unit to guide its development until the next ARC review.

Graduate education, and the Ph.D. programs in specific, form one of the components of these reviews. Guidelines on preparing the self-study will be included in the materials made available to the visiting committee while it is at the University. In conducting their own evaluations, both the external visiting committee and ARC include an assessment of the

strengths and weaknesses of the Ph.D. programs, their standing compared to those at other universities, and recommendations for how they can be improved. ARC shares the information it collects and its assessment with the Executive Committee and the Dean of the Graduate School as well as including it in its report to the Vice President for Arts and Sciences.

For Ph.D. programs outside of the Arts and Sciences, the Dean and Executive Committee of the Graduate School have introduced a similar process of review that involves the preparation of a self-study by the program's faculty, an evaluation by a team that includes faculty from both Columbia and another university, and a final report by the Executive Committee that assesses the program's quality and includes recommendations for its improvement. The Dean uses the report to discuss the program's future with its faculty, the dean of the School within which it is offered and members of the University's central administration.

A recent example of the way in which these reviews contribute to the enhancement of Ph.D. education at Columbia can be seen in the 2003-04 review of the program in Urban Planning. The review identified the need for guaranteed, multi-year funding as critical to the success of the program. Students and faculty alike cited its lack as a key competitive disadvantage in attracting the very best students and as prolonging the time required to complete the degree. Using the findings of the review committee, the Dean of the Graduate School of Architecture, Planning and Preservation worked with the Provost and the Graduate School of Arts and Sciences to introduce a plan to guarantee five years of funding for incoming students in the program, starting with the Fall 2004 class.

The Graduate School of Arts and Sciences

Regardless of discipline, all Ph.D. programs at Columbia, including the one Teachers College directs in education, are offered through the Graduate School of Arts and Sciences to which the University Statutes have assigned exclusive authority for conferring the Ph.D. and the Master of Philosophy (also the Master of Arts, with limited exceptions at affiliated institutions).

The Graduate School has adopted the following Mission Statement to guide its educational programming:

The mission of the Graduate School of Arts and Sciences, as one of the oldest and most distinguished graduate schools in the United States, is to promote excellence at every level of graduate education. The Graduate School enables students to acquire advanced knowledge and skills in specific disciplines in the humanities, natural sciences, and social sciences and in multidisciplinary scholarly pursuits; to prepare students seeking the M.A. and Ph.D. degrees for a variety of careers in the twenty-first century; and to support, in intellectually rich and rigorous degree programs, the acquisition of knowledge for its own sake. We recognize a dual obligation to encourage responsible scholarly research by students and faculty and to connect graduate education across the disciplines appropriately to the urban, national, and global environment. Finally, we seek not only to develop the intellectual abilities of our students in their chosen fields but also to create a diverse community of scholars, promoting the integration of graduate students into both the research and educational missions of Columbia University.

The Graduate School is part of the complex of seven Faculties and 29 departments of instruction that make up the Arts and Sciences. The 29 departments include 13 in the Humanities, five in the Social Sciences and nine in the Natural Sciences plus the School of the Arts and the School of International and Public Affairs which are both Faculties and departments. The Graduate School has direct administrative and budgetary authority over the 31 Ph.D. programs in these units.

The University Statutes establish the juridical authority of the Graduate School of Arts and Sciences over the other Ph.D. programs in one of two ways. For educational purposes, the Statutes assign to the Graduate School an additional 16 departments that belong to the Foundation School of Engineering and Applied Science and the College of Physicians and Surgeons, two independent Faculties of the University that are statutorily and administratively separate from the Graduate School in all other respects. The Graduate School supervises the remaining Ph.D. programs through doctoral subcommittees. The Statutes give it that power by designating the Graduate School as an administrative board with the authority to prescribe the requirements and regulations for the Ph.D. programs in parts of the University that are not statutorily part of the School. The use of this mechanism, as opposed to including the Faculties as departments in the Graduate School, is an historical artifact with no practical significance. The Graduate School supervises the Ph.D. programs in those Faculties in the same manner as the engineering and biomedical sciences programs.

Every Ph.D. program, regardless of its location, is supervised by the Executive Committee of the Graduate School of Arts and Sciences which has, according to the School's Stated Rules, "continuous responsibility on behalf of the Graduate School for the general educational policies of the University, the quality of instruction, and the quality of the teaching and research staffs of the Faculty and Doctoral Program Subcommittees which comprise the Graduate School of Arts and Sciences." The School's Stated Rules are included as Appendix A of this self-study.

The Executive Committee consists of 21 faculty members elected to staggered three-year terms by the faculty of the Graduate School. Any member of the School's faculty may make nominations to the Executive Committee, but they typically come from the deans and department chairs. The 21 faculty seats on the Committee are distributed according to a formula defined in the School's Stated Rules to ensure a broad representation of the programs leading to the Ph.D. The departments in the Humanities, Social Sciences and Natural Sciences of the Arts and Sciences each have four members on the Committee. There are, in addition, two members from the Biomedical Sciences at the Medical Center and one each from Architecture, Business, Engineering, Journalism, Public Health, Social Work and Teachers College. The Executive Committee also has two student members, the current and the out-going chair of the Graduate Student Advisory Council. The student members each serve two-year terms. The Dean of the Graduate School serves as the Committee's Chair. The current membership of the Executive Committee is listed in Appendix B.

The Executive Committee has broad supervisory powers over the University's Ph.D. programs. It has the authority to fix the admissions and degree requirements of the programs, to advise the Dean on the School's financial aid policies and the appointment of its students to teaching and research appointments, and, more generally, to consider "all matters affecting the general welfare of the faculty members and students of the Graduate School . . ." Jointly with the Dean, its approval is needed to:

- 1) Change the policies and regulations of the Graduate School;

- 2) Start new Ph.D. and M.Phil. programs and make any substantial changes in existing programs;
- 3) Offer new courses that fulfill requirements leading to the Ph.D. and M.Phil. degrees and re-offer courses that have not been given for more than five years;
- 4) Assign new instructors to teach courses in the Ph.D. and M.Phil. programs; and
- 5) Designate sponsors for all Ph.D. dissertations.

The Executive Committee exercises similar powers over the University's M.A. programs.

Decentralization

While the University Statutes vest statutory authority for Ph.D. education in the Graduate School of Arts and Sciences and its Dean, actual responsibility is more decentralized. Therein lies both an important source of the strength of the programs and some of the problems they now face.

Decentralization occurs at two levels. Administratively and budgetarily, the Dean of the Graduate School has direct control over only the 31 Ph.D. programs in the Arts and Sciences proper. Most importantly, the Dean determines the financial aid budgets for the Arts and Sciences programs, the amount and duration of the funding their students receive, and their access to University housing. The departments administratively manage their admissions, but the Dean exercises final approval over both the size of their enrollments and the individual offers they make. In addition, the Dean and his staff actively monitor the educational progress of their

students and directly ensure that they meet the requirements the Graduate School has set for the completion of their degrees.

The Dean has a more limited influence over the non-Arts and Sciences programs which enjoy a high level of autonomy. The schools within which they are located fund and administer them separately, make their own admissions decisions and have wide latitude in deciding on their organization and content within the general requirements set by the Executive Committee of the Graduate School for all Ph.D. programs. The Dean of the Graduate School can refuse to certify their students as having completed the requirements for the degree or to approve new programs, new courses and new instructors for existing programs. However, the Dean understandably makes rare use of those powers. As a result, there are differences among the programs, some of which are significant, depending on the schools that direct them. This has, in particular, led to variations in the financial support Ph.D. students receive, as will be discussed later in this self study.

Responsibility for the curriculum and for admitting and evaluating students is even further decentralized, with the primary direction coming from the individual departments and programs. This is a necessary arrangement since the programs need the flexibility to tailor the education they offer and the requirements they expect their students to meet to their individual disciplines.

Although a full standardization of the curriculum and requirements is not desirable, the existing level of decentralization is not without its drawbacks. It creates variations in the

organization of the programs which can, in turn, lead to variability in the education and support the students receive. In addition, the faculty may be familiar with the organization of the programs in related disciplines, but they are often unaware of innovative practices in others that could help them improve the quality of their own.

With the broad authority described above, both the Dean and the Executive Committee of the Graduate School serve as a brake on the centrifugal tendencies inherent in these arrangements. In addition, the Dean seeks to overcome the semi-isolation of programs through the development of “best practices” web sites, support of central utilities such as a Teaching Center and the Center for Career Education, the periodic review of the programs described above and, within the Arts and Sciences, a regular sequence of meetings with the leadership of the individual programs. With representatives from all of the Ph.D. programs, the Executive Committee also serves as a forum for the circulation of innovative ideas and practices.

IV. Curriculum

Each program establishes the specific requirements its students must complete to earn the Ph.D. and determines the standards and methods by which their progress toward the degree is measured. These necessarily vary from one program to another to reflect the culture and expectations of their disciplines. The Graduate School, however, has established a set of basic requirements that apply to all candidates for the degree, regardless of their program. These are described in the *Graduate School of Arts and Sciences Rules and Regulations, 2005-06*, which is included as Appendix C of this self-study. They are also available on the web at <http://www.columbia.edu/cu/gsas/rules/main-menu/pages/main/index.html>.

Registration Requirements

Ph.D. students are expected to maintain a continuous registration at the University until they deposit their dissertations, unless they receive an approved leave of absence or earn their degrees *extra muros*. It is the official policy of the Graduate School to grant leaves only for medical reasons or compelling personal need, although this has not been consistently followed in the past. The *extra muros* option is available to former eligible students who submit a substantial body of independent, published scholarship of original quality as a substitute for the dissertation within 10 years of receiving the M.Phil. degree.

Rather than fixing a minimum number of courses Ph.D. students must take, the Graduate School requires them to be in residency at the University for their first six semesters. This

requirement is defined in terms of Residence Units, a category of full-time registration that also determines the tuition they are charged. Students who are awarded advanced standing for completing an appropriate Master's degree, or its international equivalent, will be credited with one or two Residence Units toward that requirement. Students normally complete their course work and qualifying exams while they are on Residence Units. In some programs, they may finish both before their sixth semester, but that does not free them from the obligation of registering for six Residence Units.

After completing six Residence Units, Ph.D. students register either for Extended Residence or Matriculation and Facilities. The first is the appropriate form of registration when a student holds a University teaching or research appointment, or is completing degree requirements other than the dissertation defense, such as a course or qualifying exam. With some exceptions, science students are given research appointments throughout the time they are conducting their dissertation research because they are funded from the grants and contracts of their doctoral supervisors. Therefore, a large majority of them are on Extended Residence after completing their six Residence Units. Many other advanced Ph.D. students do not need an appointment and often must do their doctoral research away from the University. These students can satisfy the requirement of continuous registration by registering for Matriculation and Facilities which provides them with access to University facilities and services at a lesser tuition than Extended Residence.

The Graduate School expects students to complete their degrees within seven years of their initial enrollment, with the exception of those who receive advanced standing, for whom

the expected limit is typically six years. Students may continue their enrollment beyond these maximums only with the explicit permission of their program and the Dean of the Graduate School. These requirements were designed to ensure that students finish their studies in a reasonable period of time. Most, in fact, do receive their degrees in seven years or less. However, some programs, especially in the Humanities and Social Sciences, historically allowed a significant number of students to take longer, with the result that the average time-to-degree in those disciplines has exceeded seven years. Through a combination of enhanced mentoring of advanced students and a tighter enforcement of the seven-year requirement and associated rules on funding and housing, the programs themselves and the Dean of the Graduate School have sought to bring down the time-to-degree in those programs. A later section of this self-study on time-to-degree and attrition looks at this issue in greater depth.

Students are not guaranteed continuous enrollment for the six or seven years permitted by the rules of the Graduate School. Registration is contingent upon their maintaining satisfactory academic progress in their studies. The programs themselves determine the specific standards and methods for evaluating the performance of their students, within the context of certain policies and time limits defined by the Graduate School.

Degree Requirements

In most of the programs, students earn the Master's degree en route to the M.Phil. and Ph.D. This is the case for all of the programs in the Arts and Sciences, Engineering and Biomedical Sciences and most of the others. There are, however, a few – Architectural History

and Theory, Biostatistics, Epidemiology, Social Work and Urban Planning – whose incoming students are required to have the Master's degree.

Students entering without the Master's degree typically finish the requirements for it within their first year of study. There are, however, some programs in which it is earned in the second year. The rules of the Graduate School fix two years as the outside limit for receiving the degree. Some programs require students to write an essay in order to receive the Master's degree. This requirement is most common in the programs in the Humanities and, to a lesser extent, the Social Sciences where the essay typically evolves out of a research seminar. A few also administer Master's level qualifying exams. In most, however, students are awarded the Master's after successfully completing the first-year course requirements. In the Biomedical Sciences programs, Biological Sciences and Environmental Health Sciences, they also must complete three lab rotations in which they work on research projects under the supervision of members of the faculty.

The M.Phil. represents a more substantial milestone in the students' educational progress, as it signifies that they have mastered the knowledge and skills necessary to engage in doctoral research in their respective disciplines. It is awarded after students have completed six Residence Units, all of their course work and their qualifying exams.

Before permitting their students to embark upon their doctoral research, the programs all engage in a cumulative assessment of their progress toward their degrees. Most use a combination of written and oral qualifying exams for that purpose. Some employ only one,

while others have replaced them with a combination of courses and papers. Some administer multiple exams, which can be distributed over the first two or three years of the students' studies or concentrated in an intense round of tests at a specified point in their program, most commonly after completing their course work. The exams can be comprehensive in scope, focus on selected topics or consist of the defense of the dissertation proposal. Typically, qualifying exams take place in the third year of enrollment. However, some programs administer them in the second and even the first year while others permit students to delay them to the fourth.

At both the beginning and the end of the students' dissertation research, the programs engage in additional assessments of their work. The Graduate School has mandated that Ph.D. students prepare and defend a dissertation proposal to ensure that each has a research topic that is likely to yield meaningful results and has the competence needed to undertake the project. Approximately half of the programs make the dissertation proposal a requirement for the M.Phil. As already noted, in some programs, especially in the Biomedical Sciences, the dissertation proposal actually serves as the M.Phil. qualifying requirement. The remaining programs treat the proposal as part of the dissertation phase of the students' work.

Once students finish their doctoral research, they must defend their results before a faculty committee. The Graduate School has established a standardized format for the dissertation defense, but the product the students present can vary. In most programs, they prepare a single, substantial write-up of their research. Some, however, have substituted a series of articles that are expected to be publishable in nature. As already noted, the Graduate School also permits eligible former students who have withdrawn from the programs to earn the Ph.D.

extra muros within 10 years of receiving the M.Phil. by submitting a body of original, published work.

The Graduate School has prepared a detailed description of its policies and procedures on the doctoral dissertation in a handbook which is commonly referred to as the *Dissertation Rules*, which is available on-line at <http://www.columbia.edu/cu/gsas/pages/cstudents/diss-office/dissertation/index.html>.

Within the framework created by the rules of the Graduate School, the specific requirements of the programs differ, depending on the expectations of the discipline and the knowledge and skills students must master in order to become independent scholars and teachers. Some of the differences have already been discussed. Additional examples include the number of courses the students are expected to take which varies substantially among the different programs. Another relates to the mastery of languages or research methods which is so important in some programs that it is verified through additional examinations, while it is not relevant to others. Still other programs expect students to present their doctoral research results to departmental seminars or to prepare original research papers on other topics that are defended before faculty committees.

Rather than providing a full description of these curricular variations in this document, we have summarized the degree requirements of each program in Table IV-1. The *Graduate School of Arts and Sciences Rules and Regulations, 2005-06*, included in Appendix C, contain a further description of the degree requirements. Information on the courses in each program can

be accessed through a web site maintained by the Graduate School at <http://www.columbia.edu/cu/gsas/pages/academics/main/phd-prg-list/index.html>. As part of the preparations for this self-study, the Subcommittee on Curriculum and Training conducted a survey of the 60 Ph.D. programs. The responses will be included among the materials made available to the members of the visiting committee while they are at the University.

The remainder of this section of the self-study discusses two important features of doctoral education at Columbia. These are the teaching requirement found in most programs and the means by which the faculty mentor Ph.D. students. It also describes the co-curricular opportunities the programs offer to augment their students' education.

Teaching

Since most Ph.D. students will be educators as well as scholars, the programs consider the development of the ability to instruct others in the knowledge of their discipline integral to the training they provide. Beyond preparing them for their future careers, the teaching experience students acquire makes them more competitive once they enter the academic job market. The Ph.D. students mainly teach in the undergraduate programs, but there are a few exceptions where they are given Master's level assignments.

Teaching is an educational requirement in 45 of the 60 programs. The exceptions are concentrated in schools that do not have undergraduates, but even in those schools some of the programs expect their students to teach. For example, while most of the Biomedical Sciences

programs do not have a teaching requirement, Biochemistry and Biomedical Informatics do. Similarly, the program in Architectural History and Theory expects three years of teaching while Urban Planning and three of the programs in Public Health require at least one year, even though they are based in schools that enroll only graduate students.

Some of the programs that do not require teaching, such as Communications, nonetheless strongly encourage it and are working to expand the teaching opportunities available to their Ph.D. students. The rest recognize the importance of developing their students' communication skills but do so in different ways, chiefly by having them participate in departmental seminars where they present their own work, observe the presentations of faculty and scholars from other institutions and participate in the ensuing discussions.

Students in programs that make training in teaching a degree requirement are expected to participate in instructional activities for at least one year and as many as four. The requirement is the most fully developed in the Humanities and the Social Sciences where students engage in some form of teaching for three years, with the exception of those in English and Comparative Literature, and Theatre who have an extra year of instructional responsibilities. These students generally meet the teaching requirements of their programs between their second and fourth years of enrollment (or the fifth in the case of the two programs with a four-year requirement), during which they are usually involved in one course per term.

Students in the Humanities and Social Sciences frequently assume progressively greater independent responsibility over the course of their instructional assignments. They may, for

example, start by working under the close supervision of the course's instructor as graders or discussion leaders and by the end of their three or four years give lectures in their courses, if not independently teach a course section. In language and literature departments, they typically begin with an elementary language section. Subsequently, they may be given intermediate or advanced sections. By the third year they may teach conversation or composition classes and serve as teaching assistants in substantive courses in their discipline. There are, however, some programs within the Humanities and Social Sciences in which a progression in assignments is not possible due to the nature of the departments' undergraduate course offerings and the availability of other faculty resources to meet them.

Some students in the Humanities and Social Sciences may also teach in the undergraduate Core Curriculum as part of their instructional training. Most commonly, sections in the Core are reserved for advanced students beyond their fifth year and are assigned on a competitive basis, in which case they are not considered part of the programs' teaching requirements.

There is much greater variation in the amount and type of teaching the other programs expect of their students. The teaching requirements can be as little as one semester or as much as three years. The norm, however, is one year. Especially in the sciences, most students complete their instructional training in their first or second year of enrollment. These student instructors primarily serve as leaders of laboratory, recitation, discussion or problems sections under the supervision of members of the faculty. In a few departments, they may also be given independent responsibility for course sections in subjects with large undergraduate enrollments.

For example, some students in Mathematics serve as calculus instructors while some in Computer Science teach programming languages.

As part of its reorganization of Ph.D. funding within the Arts and Sciences programs, the Graduate School adopted a simplified system of student instructional appointments. Ph.D. students in those programs are appointed as Teaching Fellows in the semesters in which they are meeting their teaching requirements. Those beyond the fifth year who teach in the Core are given the title of Preceptor. Other programs have retained the University's former title structure for student officers of instruction. Depending on the students' responsibilities, they may be appointed as Readers, Teaching Assistants or Preceptors.

Both the individual programs and the Graduate School provide training in the craft of teaching to prepare the students for the classroom. The training offered by the programs takes several different forms. A few, such as French and Romance Philology, Spanish and Portuguese, Psychology and Computer Science, require or encourage their students to take a course on the methodologies of teaching in their disciplines. Others have prepared manuals that provide advice and direction on everything from course preparation to interacting with students to grading. These manuals also often include links to other teaching resources, and some contain substantive information relevant to the courses the students are teaching. Biological Sciences, for example, has both a guide for its Teaching Fellows and an extensive array of other information relevant to their instructional duties on the web at <http://turmac13.chem.columbia.edu/LearnTeach/ta.html>.

Most hold orientation workshops or seminars for their student instructors. These commonly take place once a year prior to the start of the Fall term or shortly after it begins. Some, however, are given at the beginning of every term, and others consist of a series of meetings spaced over the course of the year. Some programs organize their workshops entirely on their own; others do so in cooperation with other programs or with the Graduate School's Teaching Center. In some programs, these preparatory sessions are designed for students teaching for the first time, while in others, all student instructors, regardless of their level of experience, are encouraged or required to participate.

Some of the departments and programs have designated a specific faculty member to supervise the work of their graduate student instructors. This is especially common in the language and literature disciplines and in some of the sciences where there are a large number of class or lab sections associated with a basic undergraduate course. These supervisors meet regularly with the Teaching Fellows, either collectively or individually, to discuss course materials, pedagogical methods, and problems the students have encountered as teachers. They also visit classrooms to observe the individual student instructors and provide them with feedback on their teaching performance.

Some Ph.D. students teach in the undergraduate Core Curriculum or the undergraduate Writing Program. Both provide their student instructors with extensive training before they enter the classroom. Incoming Preceptors in the Core take a year-long seminar that meets weekly to discuss the texts that they will teach in the following week. It also holds a weekly meeting for all of its instructors at which faculty who specialize in the subjects discussed in the

texts will talk about their content and offer advice on the most effective ways of fostering student discussion about them. Graduate students teaching in the Core for the first time are required to attend while those who have had prior Core experience are encouraged to participate. To prepare for teaching in the Writing Program, its student instructors must take a three-credit graduate seminar in the Spring before they start to teach and a one-credit practicum in their first term in the classroom.

Both the Core and the Writing Program provide additional developmental support while the students are teaching. The chair of each Core course visits the classes of every new graduate student instructor at least once in their first term and follows up with individual meetings to discuss their teaching and pedagogical approaches that might facilitate greater classroom discussion. The Core also maintains both a web site and a library of resource materials the graduate students can consult for help in preparing their courses. The Writing Program holds orientations every term for its instructors, runs smaller group meetings at which the graduate students participate in peer mentoring and conducts individual classroom observations.

The Graduate School of Arts and Sciences augments the training provided by the programs through the GSAS Teaching Center. Opened in 1999, the Center seeks to enhance the teaching skills of the individual graduate student instructor and to foster an institutional environment which places a premium on excellent teaching. It defines its objectives as follows:

Our mission is to enhance the teaching skills of our graduate students and to support their professional development as researchers and scholars. We are dedicated to developing a culture that values excellence in teaching as well as

research, and to stimulating dialogue and collaboration among the faculty and graduate students involved in undergraduate education at Columbia University.

The Center was established to serve the programs in the Arts and Sciences whose Teaching Fellows and Preceptors account for over 77 percent of all of the University's graduate student instructors. Although the Center's programming primarily focuses on their needs, it is also accessible to graduate students throughout the University.

The Center offers an orientation for new Teaching Fellows at the start of every Fall semester. Most of the programs in the Arts and Sciences that do not have training sessions of their own require their new graduate student instructors to attend. During the year, the Center holds workshops, conferences and seminars, both to help students instructors and, more generally, to promote better teaching at the University. The Center also conducts consultations with individual students that can involve classroom observations, videotaping and feedback on their teaching style, and it maintains a rich library of printed resources and links to web-based materials. In addition to seeking to enhance graduate student teaching, the Center also offers its clientele advice on career development and assistance in searching for jobs by helping them create teaching portfolios and hone their presentation skills.

While the programs offer a wide array of instructional training and support, they have been less successful in providing offices in which the graduate student instructors can meet their own students. Most, but not all, set aside some space for that purpose, which the graduate students share. However, even when a program does maintain offices for its graduate student instructors, the amount of space is often insufficient to accommodate their needs. This is part of

a larger space problem Ph.D. students encounter at Columbia. The University provides most with living accommodations, as will be discussed in a later section of the self-study. However, it is unable to offer more than a few library cubicles in which to study or adequate space to house their organizations or to interact informally with one another.

The University has taken some steps to address the needs of graduate students for more space as part of a broader effort to permit its departments and schools to grow. It has recently moved a few departments to newly built or newly acquired facilities and has plans for further additions to its inventory of academic space that will permit other departments to relocate over the next two or three years. The resulting decompression of departments provides both those that move and those that take over the vacated quarters with greater space, some of which is being set aside as offices for graduate student instructors. Nonetheless, the measures the University can take in the short term to resolve its problems with academic space are limited, given its size, its location in Manhattan, and the fact that both its main campus on Morningside Heights and its Medical Center are already densely built. As a result, the potential for finding new space Ph.D. students can use to meet the students they teach, to study and to build a stronger sense of community will remain limited in the near-term.

Mentoring

Much of a Ph.D. student's education occurs outside of the classroom through the tutoring and guidance of individual faculty. The mentoring of students may not be reflected in their transcripts, but it is a critical part of their education at Columbia. By its very nature, mentoring

is less structured than the interactions that take place within the classroom. It tends to be individual, informal and personalized. Mentoring consequently can vary widely in form and frequency depending on a host of factors, such as the culture of the discipline, the practices of the department, and the student's stage of study as well as the inclinations and personalities of both the faculty supervisor and the student.

The faculty members who work most closely with the Ph.D. students are their advisors. Many students come to Columbia to study with specific faculty. Where that is not the case, their programs assign them advisors at the start of their studies to provide them with initial guidance. Over the course of their first year or two, students will identify whom they want to supervise the completion of their degrees. Some of the science programs use lab rotations to help students define their research interests and find their faculty supervisors. The non-science programs have similar mechanisms. In Social Work, for example, students frequently turn to the supervisor of a required, first-year research practicum to be their doctoral advisors; in many of the programs in the Humanities and Social Sciences, the choice often evolves out of interests and relationships developed in the course of taking colloquia and seminars.

Although the primary responsibility for mentoring students rests with their faculty advisors, other members of the programs are also involved. Many programs appoint faculty advisory committees to help the Ph.D. sponsors guide their students' education, especially once they have started their dissertation research. All Ph.D. students defend their dissertation proposals and their completed theses before faculty committees. The Directors of Graduate Studies (DGS's) in the departments in the Arts and Sciences, and their equivalents in other parts

of the University with doctoral programs, have a broad responsibility for overseeing the education of their Ph.D. students. As described in the *Ph.D. Student Handbook*, the DGS is

“the official departmental or program administrator of the rules and regulations of the Graduate School, the designated advocate of the needs of the graduate program and graduate students, both within the department and in the University, and the initial advisor of all matriculating graduate students.”

The *Handbook* is included as Appendix D of the self-study and is available on the web at <http://www.columbia.edu/cu/gsas/handbook/main-menu/pages/main/>.

Students in the sciences tend to have more frequent contact with their mentors than those in the non-sciences. This reflects disciplinary differences in how their educational programs are organized and the settings within which their students work. In most of the science programs, students pursue their education primarily through laboratory research under the supervision of individual faculty. They begin to work in labs in the first year and develop strong relationships with their advisors even before they pass their M.Phil. qualifying examinations. The amount of direct contact with their advisors depends on the nature of their research and the size of the faculty member’s lab. However, these science students are funded on the advisors’ grants or contracts, are expected to contribute to their research agendas, frequently co-author publications with them and accordingly receive individualized, often intensive training from them. Moreover, the students’ collaboration with their advisors frequently does not end once they receive their degrees. Many continue to publish with their doctoral mentors even after they have established themselves as independent scientific investigators.

Students in the non-sciences tend to interact with their advisors in different, less structured and less frequent ways. They nonetheless are in regular contact with their faculty mentors who provide them with individualized guidance throughout their studies. Their mentors play an especially active role in their education once they have embarked upon their doctoral research by supervising the collection and interpretation of their research data as well as by reading drafts of their dissertations.

None of the programs attempts to quantify the amount of time a faculty member should devote to mentoring. There are too many variables affecting the interaction between students and faculty to make that possible. They do, however, monitor the quality of the supervision faculty provide through regular reviews of the students' progress to their degrees. Recognizing the importance of mentoring to the success of its programs, the Graduate School has also sought to improve its quality. It has, for example, created a "Best Practices" web site at <http://www.columbia.edu/cu/gsas/cs/diss-office/pages/best-practices>. In addition, in 2004, it instituted the Faculty Mentoring Award in cooperation with the Graduate Student Advisory Council. The award is given each year to the two faculty members – one in the Arts and Sciences and the other elsewhere in the University – who best exemplify the ideal of the outstanding mentor.

Co-Curricular Programming

Some graduate student learning takes place outside of the formal curricular structure. Every program offers a rich array of co-curricular experiences that contribute to their students'

education and development as scholars. Programs sponsor lectures, conferences and colloquia; host debates and workshops; publish newsletters and journals; and underwrite student-organized conferences, workshops and discussion groups. In addition to the program-based activities, various institutes, centers and labs across the University also offer intellectual experiences that Ph.D. students draw upon to augment their education.

Students benefit from these experiences in diverse ways. Departmental and program seminars help students to understand the contours of a research project, including how to frame questions, the challenges inherent in data collection and analysis, and techniques for presenting materials to colleagues. Speakers expose them to the most innovative research and thought, offer the opportunity to develop relationships with scholars outside of their programs and the University, and give them experience in interacting in scholarly fora. Most programs actively encourage or even require their students to present their own work in seminars or workshops organized at the University and to participate in the meetings and conferences of their disciplines. Some also have the students themselves organize seminars and workshops. Through these experiences, students receive feedback on their own research from both established scholars and their peers that helps them complete their dissertations and move their work closer to publishable quality. They also can practice presenting papers in public before going on the job market, learn how to serve as commentators and acquire useful administrative skills that will help them in making the transition from student to independent researcher and scholar.

V. Ph.D. Learning Assessment

Learning assessment is an integral and on-going part of doctoral education at Columbia. Recognizing the diversity of disciplines in which it offers the Ph.D., the University leaves the methods of evaluation to the individual departments and programs rather than having a single, University-wide assessment plan. Not all do assessment in the same way since the means they have developed are tailored to the requirements of their disciplines. But there are considerable commonalities as well as a rich depth to the methods they employ.

The University values the diversity of approaches the departments and programs take to achieve the common goal of ensuring that students are acquiring the knowledge and skills they will need to pursue successful careers in their chosen fields. At the same time, it uses additional forms of assessment to ensure an appropriate level of standardization across disciplines. In some of the sciences, these are driven by the requirements of external funding agencies. More generally, the Dean of the Graduate School seeks to ensure that all Ph.D. students are making satisfactory progress toward their degrees. Additionally, his office has collected placement information on the University's Ph.D. graduates as a further measure of whether the programs are, in fact, achieving their educational goals. The data it has obtained are analyzed in the final section of the self-study.

The University's accreditation review has served as an opportunity both to evaluate how the programs engage in learning assessment and to develop a pool of information on assessment practices that can be shared across departments and programs. The Subcommittee on Mission

and Assessment surveyed all of the 60 Ph.D. programs for information on their practices. It asked three questions:

- What are the primary student learning objectives of the programs?
- What methods of assessment do the programs use to determine if their educational strategies are achieving the learning goals of their programs?
- How do the programs use the information they collect to make educational changes that enhance student learning and further their learning objectives?

The responses differed in their detail. Collectively, however, they indicate a universal concern for regularly testing how well the departments and programs are achieving their educational goals. They employ multiple means of evaluation for that purpose and use the resulting information to improve the quality of the instruction they provide as well as to evaluate the progress of their students.

The Ph.D. programs share the common goal of providing their students with the knowledge and analytical skills particular to their disciplines that are needed to pursue independent careers in research and teaching. All train their graduates to fill positions at universities and colleges. Many, such as Business, Chemistry, Computer Science, Economics, Epidemiology, Social Work, Statistics and Urban Planning, also define their mission as preparing their students for other careers in academic and industrial research centers,

government, non-profit organizations and corporations that utilize the type of advanced education they impart. Consistent with these goals, the faculty of the programs individually and collectively evaluate the learning of their students.

At the course level, each professor assesses how well the students are mastering its subject matter through the mechanisms faculty typically employ. The exact combination will vary, depending on the type of course and its content, but can include, among others: papers, exams, class presentations or projects, class discussion, lab rotation evaluations and individual consultations focusing on either specific topics or the student's general performance. Once students reach the stage of doing research for their dissertations, faculty supervision and evaluation take on a more personalized, one-on-one complexion, as discussed in the preceding section of the self-study. Ph.D. students in the sciences are in regular, sometimes daily, contact with their thesis advisors who provide them with direction, advice and feedback. In other disciplines, the interaction may not be as frequent but is similar in purpose.

In addition to using the information obtained in these ways to evaluate and help individual students, faculty employ it to make changes in the content of their courses or dissertation mentoring and in the manner in which they are delivered. These can be as subtle as changes in nuance, emphasis or pacing to align the delivery of the course content with the students' ability to absorb the subject matter. In other cases, the information can lead faculty to rethink and substantially redesign the course.

Every program periodically assesses whether its students are obtaining the requisite knowledge and skills to pursue independent careers in its discipline. Many of these forms of assessment have already been discussed in detail in the preceding section of the self-study. All doctoral students must pass several key milestones spaced over their education at Columbia. These include the conventional methods of assessment found at any university offering the Ph.D., but the form, content and timing of these milestone events vary from one program to another. The most important of these are the qualifying exams for the M.Phil., the defense of a thesis proposal and the presentation of the completed dissertation to a faculty committee, following the procedures defined by the Graduate School's *Dissertation Rules*, which is on the web at <http://www.columbia.edu/cu/gsas/pages/cstudents/diss-office/dissertation/index.html>.

Individual programs supplement these conventional forms of assessment with other types of evaluation designed to test whether they are achieving their educational goals. For example, most programs do not wait until the milestone events described above to obtain a measure of their students' educational progress. Instead, they hold reviews annually or even each semester. In some, the evaluation is done by a faculty committee; in others, by the entire faculty of the program or by all of those in one of its subfields; and in still others, by the Director of Graduate Studies or another faculty member in consultation with each student's advisor. Commonly, the students write a personal statement about their studies and are often interviewed as part of the review. Many programs also have each of the students' professors prepare annual written assessments of their performance and progress. Although the results of these reviews are primarily used to provide students with guidance, they also constitute a valuable source of information on the educational effectiveness of the programs.

To assess students' acquisition of the skills and knowledge needed to conduct original research and effectively communicate the results, programs may require them to complete one or more papers of publishable quality even before they start the dissertation. Some have the students present the results at departmental seminars or conferences for review and discussion. In the sciences and some non-science disciplines, the publication of those papers, particularly in peer-reviewed journals, is another indicator used by programs to assess the success of the education they provide.

Once students in the sciences have made substantial progress toward completing their dissertation research, it is common for them to present their findings at departmental seminars. Although less widespread, public presentations are also part of the educational culture in many of the non-science programs.

All of the programs in the Arts and Sciences and most of those directed by the other schools consider teaching assignments an integral part of the education of their students. These programs assess the students' mastery of the skills of teaching and of the subject matter they teach through classroom observations, student evaluations, where they are available, and periodic meetings with the students' faculty advisors.

While chiefly designed to assess student progress toward their degrees, the programs have also used the information they have acquired through these means to improve the educational training they provide. It has helped to inform programmatic decisions to add new courses and change the content of those already offered, to eliminate some requirements and

introduce others, to modify the form and content of the comprehensive qualifying exams and to expand support for co-curricular activities. Some programs have also used it to add new members to their faculty, drop others and, more generally, alter the direction of faculty recruiting. Some have even chosen to reorganize their physical space in response to what they have learned.

To cite a few of the many specific examples described in the responses to the survey of the Subcommittee on Mission and Assessment:

- Political Science introduced a second-year research paper in response to the perception that students were waiting too long to begin original research and is currently considering whether to require a dissertation development seminar in the third year to improve progress towards the degree.
- Applied Physics and Applied Mathematics designed a new curriculum, created new interdisciplinary forms of instruction, revised the content of its doctoral exams, enhanced its advising and improved its orientation program for new students.
- Philosophy decided to phase out its comprehensive exams after concluding that they were neither effective evaluative tools nor useful preparation for doing doctoral-level research. In their place, it now depends on a series of courses to ensure that its students have the requisite knowledge of their fields and requires them to conduct a

review of the literature in the subfield in which they will write their dissertations that culminates with their submission of two papers.

- The Program in Architectural History and Theory reported that it reduced the courses its students are required to take.
- Economics has modified its second-year curriculum to strengthen the training it offers in econometrics.
- Communications, Art History and Statistics all added advanced level courses for students working in specific sub-specialties.
- Urban Planning expanded its support for student presentations at professional meetings and workshops, both to give them experience in presenting their work in scholarly venues and to help bring them to the attention of their future disciplinary colleagues.

None of these changes have been made purely on the basis of the information gained from the methods of learning assessment the programs employ. However, that information has played a vital part in the larger effort by the programs to ensure that their students are educationally prepared to succeed as their fields evolve.

Training grants also serve as a valuable tool for assessing program effectiveness. Columbia currently has 22 active training grants that help to fund the education of Ph.D. students. Of these, 20 are in the Biomedical Sciences and Public Health programs situated in the University's Medical Center. The other two support students in the programs on the Morningside campus in Biological Sciences and Social Work. Funded by the National Institutes of Health and the National Institute of Mental Health, the current training grants have a total value of \$5.8 million. A major part of that money is used to support more than 125 Ph.D. students. The rest funds post-docs.

The training grants are awarded for five-year periods through a competitive process that evaluates the quality and effectiveness of a program in comparison to similar programs at institutions throughout the country. Original and five-year renewal applications both require a detailed assessment of the progress of the program's students. They discuss the research and course work of each student who is or will be supported on the grant and include information on any public presentations they have made, any work they have published and any fellowships and honors they have received. The programs are also expected to follow the careers of their graduates and to report on their current positions, publications and success in obtaining external research awards. As a further measure of their quality, the proposals include information on their Ph.D. applicants, redacting anything that would reveal the identity of those who were not admitted. At least every 10 years, each program with a training grant undergoes a site visit by a team of faculty from other universities and representatives of the funding agency. In between the competitive proposals, the programs submit annual reports to the granting agency in which

they discuss the work each graduate student on the training grant has completed in the preceding year and report on the positions of its new graduates.

The application for a training grant is, by itself, a valuable exercise in assessing Ph.D. learning, as it requires the systematic collection and evaluation of information about Ph.D. students, both current and past. The annual reports require a careful assessment each year of the effectiveness of a program's success in achieving its educational goals. The report on the five-year application by the external evaluators and the site visits provide periodic evaluations of the program's strengths and weaknesses by an independent source. Finally, since competition for training grants is intensive, successful applications are a further indicator of the success of the programs in preparing their students for independent careers in the fields they cover.

The Dean of the Graduate School has added a further layer of assessment to the evaluations conducted by the individual faculty and the programs. In addition to the dissertation proposal and thesis defense, the Graduate School requires Ph.D. students beyond their fifth year of enrollment and their dissertation sponsors annually to complete a written progress report on their work. The Graduate School uses a standardized form for this purpose, an example of which is on-line at http://www.columbia.edu/cu/gsas/pdf-files/report_progress_candidate.pdf. Starting in 2006, students and their advisors have been able to access, complete and submit the report on-line through a secure web site by using their University network ID. As part of the report, the student describes the work completed in the preceding year, establishes goals for the next and defines a timetable for finishing his or her degree. The sponsor adds a written critique of the

student's statement following a meeting to discuss his or her plans and goals. Both the student and sponsor are required to sign the report.

The programs use the progress reports, in combination with other sources of information, to assess their students' progress toward the completion of their degree, to identify students at risk and develop plans that address their problems, and to determine if the students should be permitted to continue with their studies. They also use the reports to help in evaluating the quality of mentoring their students receive. The reports are submitted to the Office of the Dean of the Graduate School which conducts its own evaluation of the students' progress. Although the Dean must necessarily defer to the programs in assessing the quality of students' academic work, he and his staff use the reports to help monitor compliance with the seven-year limit on enrollment.

In addition, the Graduate School has begun to survey both current students and alumni of the Ph.D. programs to obtain information on their perceptions of their experience at Columbia. The student survey was initiated in the Spring of 2005 but was given only to those in the Arts and Sciences because many of the questions addressed funding arrangements, requirements and services that are distinctive to those programs. When next administered, the survey may be broadened to make it applicable to other programs. The Dean is also in discussion with his counterparts at other private research universities about including common questions in their respective surveys to generate data that can be shared across institutions. While primarily designed to measure student satisfaction, the survey offers an indirect but nonetheless valuable

form of learning assessment by providing student input on how well they believe they are being educated.

With the passage of time, graduates of the programs gain a different perspective on the quality of their education at Columbia and especially on its value in preparing them for their chosen careers. Therefore, the Graduate School also initiated a survey of Ph.D. alumni and expects to repeat it at intervals in the future. Among other questions, the survey asked the alumni for their opinion of the quality of their education and how it affected their career goals. It also asked for their current positions – information that will help to improve the quality of the career data collected from the programs in 2004-05 to evaluate how well those programs are achieving their educational goals. The data from the programs are discussed in the final section of the self-study on career services.

The responses to both surveys are still being analyzed but there are some preliminary results from the enrolled student survey. Over 37 percent of the students in the Arts and Sciences programs completed the survey. These were divided almost equally among the Humanities, Social Sciences and Natural Sciences and between men and women. Among those responding, 30 percent were very satisfied with their graduate school experience and another 46 percent were somewhat satisfied; 82 percent indicated that they would recommend their doctoral program to others. More specifically,

- 68 percent expressed satisfaction with the frequency of their contact with their faculty advisors and 82 percent considered the advice they received valuable;

- 67 percent considered their teaching requirements useful, but only 31 percent rated the quality of the departmental training they received as excellent or good and only 26 percent gave similar ratings to the training offered by other sources;
- A large percentage reported that they were satisfied with the library resources available to them (88 percent) and the IT support they received (76 percent);
- 69 percent expressed satisfaction with University housing and 53 percent with the Health Services; and
- 87 percent indicated that they did not need child-care support; among the remainder, 10 percent expressed dissatisfaction with the available alternatives.

VI. Faculty

The Ph.D. programs draw their faculty from all parts of the University. Most hold appointments in the schools and departments responsible for the programs, but not all. Others also contribute by offering courses that fulfill Ph.D. requirements, mentoring students, participating on doctoral defense committees and even serving as dissertation sponsors. Additional faculty belong to affiliated institutions. More than 70 faculty at Barnard College are active participants in the programs in the Arts and Sciences. Selected faculty at Teachers College are involved in programs other than the one in Education which the College directs. The program in Ecology, Evolution and Environmental Biology draws much of its faculty from a consortium of New York area institutions called CERC (Center for Environmental Research and Conservation) that includes the American Museum of Natural History, New York Botanical Garden, Wildlife Conservation Society, and Wildlife Trust as well as the University. Members of the American Museum of Natural History also play an instructional role in Astronomy and in Earth and Environmental Sciences.

Faculty have varying levels of involvement with the Ph.D. programs. The core faculty consist of those who have been appointed as dissertation sponsors by the Executive Committee of the Graduate School of Arts and Sciences on the nomination of the individual programs. Sponsors must have an appointment in a Graduate School department, be a member of a doctoral program subcommittee or be at an affiliated institution, such as Barnard or Teachers College. Any full-time faculty member in a professorial rank who meets one of those criteria may serve as a sponsor, but the Executive Committee recommends that, wherever possible, nontenured

faculty should serve as co-sponsors with a tenured colleague rather than having independent responsibility for supervising a dissertation. Retired faculty may continue to serve as the sponsors for their former students, while adjunct faculty may supervise dissertations as co-sponsors. In Fall 2004, 1,086 faculty were approved to be dissertation sponsors. Table VI-1 shows their distribution by school and affiliated institution and by tenure status.

A larger group of faculty cooperates in directing each of the programs. In addition to those designated as dissertation sponsors, they include others with an on-going involvement in the program such as nontenured faculty who are not sponsors, adjuncts, lecturers and faculty at affiliated institutions. These are drawn primarily from the field the program covers and from related disciplines. Each program determines its own faculty membership.

At the broadest level, the Ph.D. faculty includes anyone offering courses doctoral students might take or who otherwise assists in their education. In theory, any of the University's faculty may contribute to one or more of the Ph.D. programs in this manner. However, the number in the University's clinical departments and some of its professional schools, such as Law, who do so are limited.

The following discussion of the composition of the Ph.D. faculty looks at those individuals whom the programs themselves have identified as their members. As noted above, other individuals contribute to Ph.D. instruction but the programs do not list them among their faculty. Table VI-2 provides a count of the individuals each of the programs reported on the web site of the Graduate School as being members of its faculty in 2004-05. Since it is common for

individuals to be members of more than one program, those with multiple affiliations are included in the numbers for each of the programs with which they are associated.

Faculty at Columbia are appointed in departments of instruction rather than in an educational program. Table VI-3 distributes the Ph.D. faculty across the University by those departments, with each faculty member counted only once in his or her primary department of appointment. Faculty at Barnard and Teachers Colleges hold Columbia appointments by virtue of the University's affiliation agreements with their institutions. Since they may not hold a second instructional appointment in a Columbia department, they are included in the column labeled "Affiliates." The remaining faculty who participate in the Ph.D. programs hold part-time University appointments and are counted accordingly in the Table.

In Fall 2004, the Ph.D. programs designated 1,569 individuals as members of their faculties. These included 1,254 full-time faculty and 233 who held part-time University appointments. The latter included some retired faculty who continued to teach on a part-time basis. Another 82 were from Barnard or Teachers College. Altogether, 80 percent of the Ph.D. faculty held full-time University appointments. In some programs that percentage reached 100 percent.

A third of all the part-time faculty participated in only two programs in the Natural Sciences. Ecology, Evolution and Environmental Biology included 61 members of the University's consortial partners in CERC among its part-time faculty. The program in Earth and

Environmental Sciences had 18 adjuncts whose primary institutional appointments were as members of the research staff at the University's Lamont-Doherty Earth Observatory.

Only 38 percent of the University's 3,270 full-time faculty and 6 percent of the 4,143 appointed in a part-time rank were members of a Ph.D. program in Fall 2004. The percentages were so low because of the large number of clinicians with appointments in the University's Medical Center, few of whom participate in the Ph.D. programs. In other parts of the University, the figures were much higher. In almost all of the schools and departments with Ph.D. programs, over 90 percent of the full-time faculty and almost all of those appointed full-time in a professorial rank were members of the doctoral faculty. There were three exceptions to this pattern. Only 63 percent of the full-time faculty in Architecture and 64.66 percent of those in Business were members of their Ph.D. programs; the remainder worked exclusively with the Schools' Master's students. In Public Health, the figure was even lower – 53 percent – since there are Ph.D. programs in only four of its six departments and the School has a significant number of faculty appointed in a clinical rank.

Among the full-time doctoral faculty, over 54 percent held appointments with tenure. The nontenured faculty can be further divided between those who are eligible for tenure and those who are not. Faculty who are on the tenure-track accounted for 33 percent. Those not eligible included some faculty in the Medical Center appointed with a clinical title and some on the Morningside campus who have substantial professional experience and expertise but do not have the scholarly credentials expected of tenured or tenure-eligible faculty. They also included lecturers and associates in several departments in the Arts and Sciences, who provide instruction

in languages or who supervise lab instruction in the sciences. These individuals formed the final 12.60 percent of the doctoral faculty in Fall 2004.

Women accounted for 20 percent of the tenured faculty in the doctoral programs and 38 percent of those in a full-time, nontenured rank. Altogether, 28 percent of the full-time doctoral faculty in Fall 2004 were women. A little more than 15 percent of the full-time faculty were minorities. Of these, three-quarters were East or South Asian and the remainder, Hispanic or African American. Among the tenured faculty, 11 percent were minorities, as were 20 percent of those appointed in a nontenured rank.

The average age of the doctoral faculty was 50.41 years. As one would expect, the average age for the tenured faculty was higher – 56.42 – while that for the nontenured faculty was lower – 43.22. The average age of the tenured faculty has been edging up in recent years but not by much. In 2000, by comparison, it was 55.02. However, the number of tenured faculty over 70 has grown since the end of mandatory retirement in 1994 and now stands at 76.

The full-time doctoral faculty, like the Ph.D. students, are strongly international in composition. In Fall 2004, 387 were citizens of foreign countries. That figure understates the number of the faculty who come from abroad since there are some who have become U.S. citizens. We do not have information on who has changed citizenship, but first degrees offer a reasonable proxy. Among the full-time faculty who were American citizens, 79 received their Bachelor's degree at a foreign university. Together, these two groups – those with foreign

citizenship and those with their first degree from an institution in another country – comprised 37 percent of the total full-time faculty in the Ph.D. programs in Fall 2004.

Over 96 percent of the doctoral faculty have the doctorate themselves. With a few exceptions, the remainder are lecturers or associates; belong to a professional discipline, such as architecture where the Ph.D. is not the norm; or are newly recruited junior faculty who are in the final stages of completing their own dissertations. Almost one-third of the doctoral faculty received their degrees from a group of private institutions – the Ivy League universities plus a few others such as Stanford, Chicago, Johns Hopkins and MIT – we consider our peers, while 15 percent are our own graduates. Another 12 percent studied at other private American universities and 22 percent at public universities. The remaining 17 percent received their highest degrees from foreign institutions.

The quality of Columbia's Ph.D. faculty can be measured in many different ways. One indicator of the excellence of individual members is the receipt of honorific awards, prizes and other forms of recognition. For example, the faculty currently includes five Nobel laureates; four recipients of the National Medal of Science; and eight winners of MacArthur Awards. Twenty-eight have been elected to the National Academy of Sciences and 130 to the American Academy of Arts and Sciences, while 17 belong to the National Academy of Engineering and 31 to the Institute of Medicine. Many have been elected officers of their national professional societies, served on editorial boards of the leading journals in their disciplines, been members of review panels of national funding agencies or have played other leadership roles in their fields. In recognition of their scholarly achievements, some have been awarded honorary degrees from

other universities in both this country and abroad. Each year, several win prestigious fellowships or are honored with other awards. Columbia, for example, ranks among the top universities in the country in the receipt of Guggenheim fellowships. Several have been honored with Presidential Young Investigator Awards which are given to the country's most outstanding young scientists, while others have received special prizes for outstanding work in their respective disciplines.

Especially in the sciences, the ability to compete for external funding is another indicator of faculty quality. In fiscal year 2004, investigators at Columbia submitted 2,674 competing project proposals totaling more than \$1.9 billion. The annualized value of the awards held by Columbia investigators in fiscal year 2004 was more than \$556 million. Future commitments, some of which extend to fiscal year 2010, amount to nearly \$1.2 billion. Faculty who teach in the Ph.D. programs hold a substantial percentage of the University's sponsored research awards.

Many schools and departments have been rated against their peers at other universities in surveys conducted by non-profit organizations and for-profit businesses. While many factors help to determine Columbia's rankings in those surveys, the quality of the faculty is one of the most important. The most methodologically sophisticated of these ratings was the study of the quality of doctoral programs by the National Research Council published in 1995 under the title, *Research-Doctorate Programs in the United States: Continuity and Change*. The study evaluated programs at 274 universities in 41 separate fields. Columbia offers programs in 34 of the fields covered in the study. Assessments of other Ph.D. programs at the University can also be inferred from the results. For example, the study did not rate our programs in Chemical

Physics or Classical Studies, but an assessment of the first can be inferred from the evaluations of Chemistry and Physics and of the second, from the results for Classics and History. Similarly, the study rated Statistics and Biostatistics programs together, while they are separate at Columbia. (On the other hand, the Academy rated English and Comparative Literature separately. These are part of a combined Ph.D. program at Columbia, as are Geosciences and Oceanography which the study also reviewed as separate fields.)

The Council used a rating scale of 0 to 5. The 34 Columbia programs were rated as follows:

<u>Disciplinary Grouping</u>	<u>Distinguished</u>	<u>Strong</u>	<u>Good</u>
Arts and Humanities	6	3	0
Social and Behavioral Sciences	3	3	0
Physical Sciences and Mathematics	5	2	0
Biological Sciences	4	2	0
Engineering	<u>0</u>	<u>5</u>	<u>1</u>
Total	18	15	1

A list of the Columbia programs included in the study is appended as Table VI-4.

The study of the National Research Council is, of course, based on data that are now more than 10 years old. In the intervening years, the faculty has been materially enhanced by the recruitment of new tenured faculty and the development of new cohorts of junior faculty, many of whom have emerged as among the ablest younger scholars in their fields. In the competition for faculty talent, the departments and schools have succeeded more often than they have failed.

Many of the losses, moreover, have been due to personal factors beyond the control of the University, such as the pressures associated with dual-career marriages, the difficulty of schooling children in New York and faculty or spouses who never grew comfortable with living in the City.

Of the numerous examples of the faculty's new strength, we will briefly mention two. Once regarded as among the finest in the country, the departments in the Social Sciences, with the exception of History, had slipped in stature in the two or three decades before the 1995 study by the National Research Council. Since then, the Economics Department has grown in size by 40 percent from 25 to 35 F.T.E.'s. Almost half of the new faculty has been appointed with tenure, often in collaboration with the Graduate School of Business. Anthropology has rebuilt its faculty through a combination of senior recruits and the development of several junior faculty of great promise. Incremental gains have also been recorded in Political Science, Sociology, and International and Public Affairs, while History offset the loss of some of its more distinguished faculty through retirement with the appointment of individuals of comparable distinction.

Engineering has experienced similar gains. Unlike the Social Sciences, its departments have long been at a disadvantage in competing with public as well as selected private universities that have more space, greater resources and larger faculties. Nonetheless, the School has achieved important gains since the National Research Council study. Its full-time faculty has increased in size by 50 percent and been materially strengthened at both the senior and junior levels. Over the same period, its grant volume has almost tripled.

In the last decade, the School has built a new department in Biomedical Engineering, transformed its outdated programs in Mining, Metallurgical and Mineral Engineering into a Department of Earth and Environmental Engineering, and created a strong group of faculty in Applied Mathematics where previously there had only been a modest program. In the early 1990s, there were discussions about merging Chemical Engineering with another department. Instead, the School invested in its rebuilding, brought it into closer association with the Chemistry Department and added new strength to its faculty. The School's other departments have also succeeded in enhancing their quality. Computer Science, Electrical Engineering and IEOR (Industrial Engineering and Operations Research) have all made important external hires to tenure and seen members of their junior faculty emerge as influential contributors to their disciplines. Both Civil Engineering and Mechanical Engineering have focused on recruiting outstanding juniors, a strategy that is now paying off with recent and expected promotions to tenure.

VII. Admissions

Admissions Trends

Starting in the late 1990s, many of the Ph.D. programs experienced significant increases in applications and much stronger yields. The progress has not been uniform, but even in those programs where the statistics have not materially changed, the faculty report that they are attracting a higher quality of students. Table VII-1 aggregates the applications, admissions and enrollments by school or, in the case of the programs in the Arts and Sciences, by disciplinary groupings. Some caution is in order in interpreting the numbers it contains. Part of the increase in applications is due to the development of new programs rather than to the greater popularity of existing programs. In addition, a new on-line system that is easy to use has encouraged a greater number of students to seek admission. The newness of some programs may also have depressed the admit ratios and the yield percentages in their early years since they were not yet well known among prospective applicants.

Even with these caveats, the trend in recent years has been significant. The changes have been most noticeable in the Humanities and Social Sciences where applications have grown materially, the admissions needed to generate classes of the desired size have declined, and yields have increased despite smaller class sizes. Between 1999 and 2004, applications in the Humanities rose by 15 percent and those in the Social Sciences by 60 percent, while admissions dropped by 52 and 61 percent respectively. Although the class sizes declined by 12 percent in the former, yields improved by almost 25 percentage points. In the latter, the corresponding

figures were a 39 percent reduction in class size and an increase in yield of over 14 percentage points.

The changes in some individual programs in the Humanities and Social Sciences have been even more substantial, as shown by Table VII-2 which compares the statistics for the classes entering in 1999 and 2004. Most noticeable is the percentage drop in the number of applicants accepted and the equally pronounced rise in yields. The first is an indication of the programs' confidence in their competitiveness for the best applicants; the second is confirmation that their confidence is increasingly well-placed.

Similar patterns have appeared in some programs outside of the Humanities and Social Sciences, although the changes have been more selective and the improvements have been realized over differing periods of time. In Public Health, for example, the number of applicants started to increase in 1999 and the admission percentages began to improve in the same year, but the yields did not begin to climb until 2001. In Social Work, the changes date from 2002. In the Graduate School of Architecture, Planning and Preservation, the program in Urban Planning saw material growth in its applications in 2003 and a significant decline in admits the following year. (These improvements are masked in Table VII-1 by the unchanging nature of the statistics for the School's other program, the Ph.D. in Architectural History and Theory.)

The changes in the admissions statistics, especially those for admitted applicants and yields, tend to be concentrated in the programs that have introduced better systems of funding for their students. Those enhancements will be discussed in a later section of the self-study.

However, other factors have also played a role. The addition of new faculty has attracted students interested in working with them. New York has proven to be an increasingly valuable recruiting asset, especially in programs, such as Art History, Architectural History and Theory, Journalism and Social Work, where the resources of the City have a direct relevance to their educational content. Finally, all of the Ph.D. programs moved in 1999 to an on-line system of application that has made it much easier to apply.

The admissions officers in the schools believe that a significant portion of the increase in applications can be explained merely by the ease of using the new on-line system. To the extent that is correct, the growth in the size of the applicant pool does not necessarily reflect an improvement in its quality. The changes in the other numbers, on the other hand, represent a more clearly positive trend.

Most of the schools survey admitted applicants to determine why they accept or turn down offers. The responses show that the presence or absence of adequate funding has a decisive influence on their decisions. Before the Graduate School adopted a system of multi-year fellowships in the Humanities and Social Sciences, the admits to those programs who went elsewhere regularly cited better financial support as the major reason for their choices. Since then, financial considerations have become a much less common reason for losing admitted applicants. There continue, of course, to be exceptions, especially when an applicant is awarded a special fellowship package elsewhere that is richer than our programs' standard funding offers.

The responses from applicants admitted to programs in other parts of the University show a similar pattern. In those that fully support their students, a majority of the admitted applicants indicate that funding is not the primary factor for choosing where they decide to study. In those without guaranteed funding, financial considerations affect the survey results in the manner one would expect. When financial support is available, it allows applicants to make their decisions on academic grounds. When students are admitted without promises of support or with packages that are substantially less generous than offers from other universities, admitted applicants who turn down our offers commonly cite the inadequacy of funding as their reason for selecting our competitors.

When financial considerations are not a factor, applicants most commonly decide where they will study on the basis of the quality of the programs at the universities to which they have been admitted and especially the faculty in their areas of specialization. When the Columbia programs are perceived as strong in quality and structured in a manner that permit applicants to pursue their particular educational interests, the results of the survey, as well as the yield statistics, indicate that Columbia competes successfully for the best students.

Admission Process

Admissions decisions to the individual programs are made by the schools that have administrative and budgetary authority over them. The Executive Committee of the Graduate School oversees admissions policies for all of the programs, and the Dean's Office of the School helps to process applications to some programs outside of the Arts and Sciences. However, the

Graduate School directly controls admissions in only the 31 programs within the Arts and Sciences. Despite this decentralization of authority, decisions on admissions to the Ph.D. programs are made in similar ways across the University.

In the schools that provide guaranteed funding, the number of offers a program makes each year is fixed by the dean, following negotiations with the programs. With the exception of Public Health, this is also the norm in those that do not provide full financial support, although the programs themselves have a larger role in determining offers. In Social Work, for example, the doctoral program will make additional offers beyond the number the Dean initially authorizes when qualified applicants have a guaranteed source of external funding. In Engineering, the departments have the flexibility to make unfunded offers, although they do so with increasing infrequency since the School's Dean effectively determines the number of offers through his control over the sources of financial aid. He allocates the central school funds available to support Ph.D. students – chiefly those that fund teaching assistants and other student instructors – and tells the departments how many appointments as graduate research assistants they can make from their grants and contracts.

As noted above, Public Health is the one exception to this pattern. The four departments in the School with Ph.D. programs independently determine the number of offers they will make, attempting to match their admissions to the available funding for their students. However, the Dean exercises influence over their decisions through the School's regular consultative processes for addressing academic and budgetary questions.

Across the University, there may be a further allocation of the authorized offers within the individual programs themselves among sub-fields and even individual faculty. The manner in which the distribution is managed can vary widely in its formality, the allocation criteria and procedures used for dividing up the possible offers.

The number of offers is determined primarily by a combination of financial considerations – the school’s budget for financial aid and the potential for external funding – plus the program’s success in recent years in recruiting new students. In deciding how many to authorize, the deans look at past patterns of offers and yields in an effort to anticipate the numbers needed to produce an incoming class of a size that can be supported by the school’s financial aid budget for the next year. When a program has missed its target for expected new enrollments in the preceding year or two, the dean will typically adjust the number of offers it can make to bring its size back to the expected levels. The deans will also make permanent adjustments in response to long-term changes in applicant interest or as a result of strategic decisions to expand or shrink the size of individual programs. For the programs in the Arts and Sciences, such strategic decisions are made through the ARC review process described in a previous section of the self-study.

The schools and the faculty use a variety of formal and informal means to market the Ph.D. programs. All have on-line information about their programs and bulletins in both electronic and printed form. Some also produce printed viewbooks. Copies of the printed materials will be included among the documents available to the members of the visiting committee while they are at Columbia.

Faculty, and sometimes school admissions officers, take advantage of professional society meetings and scholarly conferences to disseminate information about the programs. Sometimes they also go to graduate student recruiting fairs and, less frequently, visit individual schools. Some also advertise in professional publications. Informal referrals by colleagues at other universities are an important source of well-qualified applicants and sometimes lead to direct approaches – mailings, e-mails and even phone calls – to individual prospective students. Some programs invite applicants to whom they anticipate making offers to the University for interviews. Others extend invitations to visit Columbia to those they admit. Still others encourage their own graduate students to reach out to admitted applicants in an effort to persuade them to attend the University.

While all of these mechanisms help to shape the applicant pool, the schools depend primarily upon the quality of the programs and the faculty as a recruiting tool. They find that the individuals who apply are largely self-selecting. Most tend to seek admission because they see our programs as strong in their own areas of interest or because they want to work with specific members of our faculty. Therefore, the schools and programs currently see no reason for replacing their more informal methods with more systematic recruiting initiatives, except in the case of minorities, as described below. Their priority is not to generate more applicants. As already discussed, that is happening in many programs independent of any marketing initiatives. Instead, they are looking for high quality applicants and believe that their current, less formal means of attracting such individuals are working well.

The one exception to the prevailing pattern of recruiting consists of a more concerted effort to attract minority students who have been traditionally underrepresented in Ph.D. programs. (Both the Graduate School of Arts and Sciences and the Fu Foundation School of Engineering and Applied Science are also working to increase their enrollments of women in the sciences.) Some of the schools send recruiters – usually faculty but sometimes admissions officers – to universities and associations with significant numbers of minority students and advertise in specialized journals that they might read. Some also seek to cultivate potential minority applicants by bringing them to campus.

The Graduate School engages in the most comprehensive effort at minority recruiting. Through a combination of targeted marketing, on-campus programming and offers of special funding, it seeks to encourage minority interest in its Ph.D. and other programs. These initiatives are coordinated by an Office of Minority Affairs, established in 1989 both to help increase the enrollment of historically underrepresented minorities (African American, Mexican American, Native American and Puerto Rican) and to provide better support to those who are admitted.

The Director of the Office of Minority Affairs, with support from other members of the Dean's staff and sometimes members of the faculty, attends graduate student fairs and conferences where experience has shown that they can reach significant numbers of minorities who are likely to be qualified for admissions to our programs. In addition, they make recruiting visits to individual colleges and universities. They also work with programs and professional organizations that serve underrepresented minority students as part of their recruiting strategy.

These off-campus efforts are augmented by on-campus programs, such as the Graduate School's Summer Research Program, which seeks to encourage underrepresented minorities to consider academic careers by bringing them to Columbia to engage in research for two months under the supervision of a faculty member. While they are at the University, they are given a stipend and provided with housing.

The School also uses financial incentives to attract underrepresented minority applicants. In addition to its standard multi-year financial packages, the School offers these students special summer funding for three or four years, depending on their disciplines. In addition, the Office of Minority Affairs distributes competitive fellowships at the dissertation stage. Although modest in size, these help minority students to concentrate on completing their degrees.

The number of underrepresented minorities has increased over the past five years, although their numbers remain lower than we desire. Much of the increase can be explained by the changes in the Graduate School's overall funding policies, described in a later section of the self-study. Prior to their introduction, the Graduate School's fellowships were simply not competitive with the offers well-qualified underrepresented minority students were receiving from other universities. The special funding described above has augmented the School's standard fellowship package, thereby making it even more attractive, while the recruiting coordinated by its Office of Minority Affairs has provided individualized attention that has persuaded some students to select Columbia over another university.

Few participants in the Summer Research Program have gone on to pursue the Ph.D. at Columbia. However, the program has realized its broader objectives by helping to expand their interest in post-baccalaureate education in general and the Ph.D. in specific. Since 2000, approximately 20 percent of its participants have enrolled in a Ph.D. program at another institution while others have gone on to study for professional degrees here at Columbia or at other universities.

The evaluation of applications is done by the faculty of the individual programs. Each program has its own doctoral admissions committee, consisting of at least three faculty members and often more. Normally, the members are appointed by the chair when the program is based in a department and otherwise by the dean of the school. In some programs, the members of the admissions committee will read all of the applications themselves. More often, they farm out the folders to subcommittees or individual faculty to ensure evaluations by individuals with expertise in an applicant's area of interest. Once the reviews have been completed, the committee convenes to decide which applicants should be given offers, based on the number the program is authorized to make and how it has decided to distribute its offers among its specialties and faculty.

The deans of the schools overseeing the programs send out the letters of offer and do have the authority to depart from the decisions of the programs on whom to admit, although they rarely do so. Typically that happens when the members of the doctoral admissions committee are internally divided over the choices or the admission of a candidate would violate one of the rules governing the Ph.D. programs.

VIII. Enrollments and Degrees

In Fall 2004, there were 3,287 students enrolled in the 60 Ph.D. programs under review. These constituted 13.7 percent of the University's total enrollments of 24,037 and 15.6 percent of its 21,129 degree candidates. With the exception of the Bachelor of Arts, more students are studying for the Ph.D. than for any of the other 24 degrees offered by the University.

While the Arts and Sciences offers slightly more than half of the Ph.D. programs, they had 2,077 students, or 63 percent of the total enrollments, as Table VIII-1 indicates. The largest number of students was concentrated in the departments in the Humanities, with almost one-quarter of the total, followed by the Social Sciences with 20 percent, and the Natural Sciences, with 19 percent. Outside of the Arts and Sciences proper, the Biomedical Sciences programs had 12 percent of the total Ph.D. enrollments and the departments in Engineering, 13 percent. Collectively, the other schools accounted for a little over 10 percent of the total.

Over 72 percent of the degree candidates in the Graduate School of Arts and Sciences were enrolled in a Ph.D. program. Ph.D. students accounted for a much smaller percentage of the graduate enrollments elsewhere in the University, as Table VIII-2 demonstrates. In some of those schools, their comparatively small percentage of the total enrollments affects the support they receive, as the schools have sought to balance their needs with those of other students. This has contributed to variations in funding and access to housing that will be discussed in later sections of the self-study.

Table VIII-3 contains data by program on current enrollments and number of graduates over the five academic years from 1999-2000 to 2003-2004. The seven largest programs are all in the Arts and Sciences. In Fall 2004, History had the most enrollments with 206 and the largest number of graduates with 142, followed by English and Comparative Literature, Art History and Archaeology, Political Science, Anthropology, Chemistry and Economics. Outside of the Arts and Sciences, the largest programs were Electrical Engineering, Business, Computer Science, the Integrated Program in Cellular, Molecular and Biophysical Studies, and Social Work.

With minor variations, the distribution of Ph.D. graduates tracks the percentages of total enrollments. The Arts and Sciences accounted for 66 percent of the total, followed by the Biomedical Sciences programs and Engineering, with 12 and 11 percent respectively. Some of the differences between the percentage of total enrollments and of graduates result from the relative newness of the programs. Some may also be explained by attrition and the time students take to complete their degrees, as will be discussed in the next section of the self-study.

Table VIII-4 offers a comparative picture of Ph.D. enrollments over the past decade. During that period, the total number of Ph.D. students has declined, as has their percentage of the University's total degree enrollments – from 17 percent to 14 percent. Their distribution among the Ph.D. programs has also changed. As discussed in the section on admissions, enrollments have declined significantly in both the Humanities and Social Sciences programs. In the former, they have decreased by a quarter since 1994 and in the latter by a third. Collectively, those programs accounted for 60 percent of all Ph.D. students in 1994; by 2004,

their portion of the total had shrunk to 44 percent. The reduction in size was accomplished primarily by cutting back on admissions. As part of the introduction of multi-year funding, the programs moved to a smaller, more selective model of accepting fewer students but providing them with sustained support throughout the first five years of their studies. We expect a similar pattern to develop over the next few years in Urban Planning for the same reason since the program adopted the multi-year funding plan of the Graduate School in 2004 and began to cut back on admissions as part of that initiative.

Some programs in other parts of the University have expanded in size over the same period. The largest numerical increases occurred in Engineering and the Natural Sciences. The greatest percentage growth took place in the programs administered by the Schools of Social Work, Architecture and Engineering. (As already noted, we do not expect the current size of the Architecture programs to be maintained in the future.) Much of this growth resulted from the opening of new Ph.D. programs. Engineering, for example, started two programs during the decade, while another that began in the early 1990s grew to steady state. New programs in the Natural Sciences, the Biomedical Sciences and Public Health also brought in additional students, although fewer in number. Some of the older programs also grew in size in response to greater student demand and the availability of greater resources to support their students.

Almost 39 percent of the students enrolled in the Ph.D. programs in Fall 2004 – 1,272 – were citizens of other countries. These students made up 30 percent of the University’s total international enrollments. In many individual programs, they accounted for more than half of the enrollments and in three for almost all. Table VIII-5 provides statistics on the international

completion of the Ph.D. programs administered by the different schools of the University. As these statistics show, international students were most heavily represented in the programs in Business and Engineering, where they formed four-fifths and three-quarters of the Ph.D. enrollments respectively in Fall 2004. While the international Ph.D. students come from over 80 countries, almost 58 percent were citizens of seven countries – Canada, the People’s Republic of China, India, Israel, Japan, Korea and Taiwan. The People’s Republic alone provided over a quarter of the international Ph.D. students.

Table VIII-6 shows the distribution of Ph.D. students by gender. Women made up 46 percent of the total Ph.D. enrollments in Fall 2004 with their representation ranging from a high of 74 percent in Public Health and 71 percent in Social Work to 23 percent in Engineering and 32 percent in Business. Almost two-thirds of the female Ph.D. students were in programs in the Arts and Sciences, with those in the Humanities accounting for 30 percent of the total. There were also considerable variations among the individual programs. In the Humanities, for example, women made up three-quarters of the students in Spanish and Portuguese and only slightly less in French and Romance Philology, while accounting for only a quarter of those in Philosophy. In Engineering, they comprised 56 percent of the students in Earth and Environmental Engineering but only 15 percent and 17 percent of those in Civil Engineering and Mechanical Engineering respectively. Women accounted for the highest percentage of program enrollments in Human Nutrition (87 percent), Epidemiology (82 percent) and Environmental Health Sciences (80 percent), all of which are located in the University’s Medical Center.

Table VIII-7 contains similar information on the ethnic composition of the Ph.D. students. These data are derived primarily from the students' own declaration of their ethnic identities. In the case of international students who did not self-report, we have assigned an ethnicity, when possible, based upon their country of citizenship. Even after those assignments, the ethnic background of almost 14.5 percent of the students remains unknown.

Among the students for whom we have information on their ethnic identities, 42 percent were minorities. As Table VIII-7 shows, minorities were most heavily enrolled in Business and Engineering. In the former, they accounted for 78 percent of those students reporting their identities and in the latter, 72 percent. Minorities also made up almost half of the enrollments in the Biomedical Sciences and Public Health programs for whom we have information on ethnicity and a slightly lower percentage of those in the Natural Sciences. Students of East and South Asian background constituted more than three-quarters of the minority students and 32 percent of all Ph.D. enrollments. In Business and Engineering, they formed two-thirds of the students of known ethnic identity. Over 6 percent of the University's Ph.D. students were Hispanic by background, and another 3 percent were African American.

Limiting the data set to United States citizens and permanent residents does not significantly alter these statistics. Almost 13.7 percent of those students did not report their ethnicity identity. Among the rest, 46 percent declared a minority status, including 37 percent who indicated that they were East or South Asian. African Americans and Hispanics respectively accounted for a little less than 3 and 7 percent of those reporting an ethnic identity.

IX. Time-to-Degree and Attrition

Time-to-Degree

The rules of the Graduate School state that students must finish their degrees within seven years of initial enrollment. While many programs permit their students to take longer only in special circumstances, others have historically had a more permissive attitude, allowing a significant percentage of their students to continue for 10 years or more. These include many of the programs with the largest enrollments.

In the period from 1995 to 2005, 4,129 students received the Ph.D. Graph IX-1 shows their percentage distribution by years-to-degree, with the numbers in each cohort included with its respective column. These are distributed in a pattern resembling a bell curve with a long tail on the high end. Almost 86 percent of the total received their degrees in less than ten years, with an average of 6.38 years and a median of 6.13 years. However, another 585 students, or 14 percent of the total, required 10 years or more to finish their degrees. Many of these did not maintain a continuous enrollment. They dropped out for varying lengths of time before being permitted to re-enroll and complete their studies. These outliers raise the average time-to-degree of the graduates since 1994 to 7.43 years and the median to 6.69 years. Their impact on the statistics for individual programs is even more significant since they were not evenly distributed across the University.

Table IX-1 shows the distribution of the students taking 10 or more years by school and disciplinary grouping. More than 80 percent were in the Humanities and the Social Sciences. The programs in those disciplinary groupings were joined by Social Work and Public Health in having a comparatively high percentage of total graduates who needed 10 years or more to complete their degrees. In contrast, less than two percent of the graduates in the Natural and Biomedical Sciences took as long, while the percentages in Business and Engineering were 4 and 5 percent respectively.

The differential impact of the outliers can be seen in the statistics in Table IX-2. To account for the effects of advanced standing, the Table separates those who received credit for work completed elsewhere from those who did not. In calculating time-to-degree, we counted from the date of initial enrollment in a Ph.D. program even though many students were not continuously registered. Thus, the averages in the Table do not reflect the semesters of actual enrollment. At the other end, the averages were depressed by students who were given substantial advanced credit for work completed in doctoral programs at other universities as part of recruiting packages for their Ph.D. sponsors.

The time-to-degree was highest in the Humanities where students, on average, took 9.44 years to complete their degree and those without advanced standing, a slightly higher 9.66. In two other parts of the University – the Social Sciences and Social Work – students were, on average, enrolled for more than eight years. Within the Humanities and the Social Sciences, the problem of extended time-to-degree was not localized to specific programs. With the exception of Theatre and Economics, the graduates in all of the programs in those disciplines took, on

average, over eight years to complete their degrees. In nine of the 15 Humanities programs, the average was more than nine years.

While the lowest average was in Journalism, it is one of the University's newest Ph.D. programs. Therefore, it is too early to say if the experience of its first graduates will be a good indicator of the time future students will require to complete the program. In the science programs (Natural Sciences, Biomedical Sciences and Engineering), the averages ranged from 5.81 to 6.22 years for all students and 5.86 to 6.45 for those without advanced standing. In Business the figures for both were 5.91 years.

On average, students who entered the Ph.D. program with advanced standing received one year of credit toward their degrees. They tended, as a result, to require less time to finish their studies than their colleagues without advanced standing, as the figures in Table IX-2 demonstrate. (The higher average in Public Health is a statistical oddity. Students in its Biostatistics and Epidemiology programs typically take less time than those in Sociomedical Sciences and tend, as well, to receive less advanced standing. Thus, they push down the School-wide average for students without advanced standing while those in Sociomedical Sciences have the opposite effect on the average for students with advanced standing.)

Students, regardless of their program, normally take three or four years to finish the M.Phil., with the differences among them primarily reflecting differences in the requirements they must complete. Thus, the variations in time-to-degree largely reflect differences in the time students take to do their doctoral research and write their dissertations.

Accurate statistics on time from the M.Phil. to the Ph.D. are difficult to obtain since the programs do not consistently certify their students as having met the M.Phil. requirements at the same point in their studies. Over the past decade, most students received the M.Phil. once they completed its stated requirements in their third or fourth year of enrollment. In some cases, however, the degree was awarded at the same time as the Ph.D. and in still others, at other times in between. Thus, the available statistics on the amount of time students have needed over the past decade to complete the doctoral phase of their studies are flawed. They, nonetheless, present an approximate picture of the variations among the programs in different parts of the University.

Excluding the obvious anomalies in the data set, the graduates in the Humanities took, on average, more than five and one-third years to progress from the M.Phil. to the Ph.D and those in the Social Sciences almost five years. In both disciplinary groupings, students with advanced standing needed slightly less and those without, a little more. These numbers are not surprising, given the proportion of graduates in both the Humanities and the Social Sciences who were enrolled for 10 years or more, as shown in Table IX-1. By comparison, students in the Natural Sciences, Biomedical Sciences, Business and Engineering required between 2.5 and 3.5 years after the M.Phil. to finish the Ph.D.

The differences among the programs reflect a combination of causes, including differences in funding. Before the introduction of the current system of multi-year fellowships in the Humanities and Social Sciences described in the next section of the self-study, some students in those disciplines took longer for purely financial reasons. In contrast, students in the

sciences were fully funded throughout their programs, reducing, if not eliminating entirely, the financial necessity of engaging in work while they were studying. Moreover, their doctoral supervisors had a vested interest in seeing them complete their degrees as expeditiously as possible since their work contributed to the overall success of the externally funded research awards on which they were funded.

The Graduate School hopes that full funding in the Humanities and Social Sciences will contribute to a shortening of the time-to-degree in those disciplines. Since the funding enhancements are relatively recent, it is still too early to determine how positive an influence they will actually have. Indeed, the presence of more secure funding could have the opposite effect of encouraging some students to take longer by reducing the financial pressure to begin their professional careers. Even when sufficient time has passed to make a comparison with prior experience possible, it will be difficult to distinguish between the effects of the fellowship packages and the other measures the programs and the Graduate School are taking to encourage their students to finish in a more expeditious manner.

Funding alone does not explain the variations in time-to-degree apparent from the numbers in Table IX-2. The programs in the Humanities and Social Sciences place the heaviest emphasis on teaching as part of their curricula. Their students are involved in teaching for three years, except in English and Comparative Literature and in Theatre where the expectation is four years. Moreover, students typically fulfill at least one year of required teaching after receiving the M.Phil. In English and Comparative Literature and in Theatre, they must teach for two while they are engaged in their doctoral research. After completing their required teaching, a

significant number of Humanities and Social Sciences students also successfully compete for positions as instructors in the sections of the undergraduate Core Curriculum for an additional year or two, a time-intensive undertaking that leaves them with less time for their doctoral research.

In contrast, the programs in other parts of the University include either less or no teaching experience as part of their degree requirements. As described in the section of the self-study on the curriculum, 11 programs do not have a teaching requirement, and the norm among the remainder that do is one year. Additionally, their students typically complete their instructional requirements prior to the M.Phil., thereby allowing them to concentrate on their doctoral research once they have finished their course work and qualifying exams.

The variations in mentoring described in the earlier section of the self-study on the curriculum also affect time-to-degree. Students in the programs with lower time-to-degree statistics tend to have more frequent contact with their doctoral advisors. In part, this reflects differences in the nature of their doctoral work. While students in the sciences usually work in the labs of their advisors, those in the Humanities and Social Sciences often conduct their research away from the University and the direct guidance of their mentors.

Finally, faculty in the Humanities and Social Sciences have simply been more accommodating of students who are unable to complete their degrees within seven years. This has contributed to a culture in which individual extensions are considered acceptable even while

the faculty recognize that extended time-to-degree is a problem for the program as a whole. This is now changing.

In recent years, both the individual programs in the Humanities and Social Sciences and the Graduate School have worked to bring down the time-to-degree in those disciplines. As discussed in the section of the self-study on the curriculum, the programs have enhanced the mentoring advanced Ph.D. students receive in recent years and monitor their progress toward their degrees more closely. Before the early 1990s, the Graduate School made little effort to limit the time students could take to finish their degrees. Since then, it has moved toward a full implementation of the seven-year rule.

Through the annual reports advanced students must complete on their doctoral research, the Graduate School tracks their progress toward their degrees more closely. In discussions with the programs in the Arts and Sciences, the Dean has made reduction in time-to-degree a priority. The School no longer permits students beyond their seventh year to retain University housing, does not give them financial aid and, as discussed in an earlier section of the self-study, is phasing out the practice of allowing them to teach in the undergraduate Core Curriculum.

Even with these measures, time-to-degree in the Humanities and Social Sciences remains longer than desirable. As the Dean of the Graduate School, Henry Pinkham, noted in a recent memorandum to the Arts and Sciences departments, delays in completion of the degree place the students at a disadvantage in competing for academic jobs as well as being detrimental to the programs themselves. A copy of the memorandum is included as Appendix E.

This year, therefore, Dean Pinkham is exploring additional policy changes with the programs as part of the School's on-going effort to shorten time-to-degree. These involve changing the enrollment status of students beyond their seventh year. Students who are making satisfactory progress toward their degrees in the estimation of their programs but are unable to complete them within seven years would be given a grace period of an extra year or two. No students would be permitted to continue in a full-time capacity beyond the grace period. They would be able to register part-time, but that could change their eligibility for the University student health benefits, require them to begin to repay student loans and, in the case of international students, affect their visa status. These changes and their consequences for students are now under discussion with the programs and the faculty.

Attrition

Historically, some of the Ph.D. programs have also experienced high losses of students before they complete their degrees. As with time-to-degree, the problem has been confined to selected programs rather than occurring throughout the University. Unlike time-to-degree, however, there has been a strong correlation between attrition and funding. As a result, attrition rates have fallen as programs that did not provide multi-year fellowships to incoming students have moved toward full funding.

Graph IX-2 shows the attrition rates in the Arts and Sciences by the year of entering class. Graphs IX-3 and IX-4 contain similar information for the programs in the rest of the University. Since the mid-1990s, there has been a sharp decline in attrition in both the

Humanities and Social Sciences. As late as 1995, over 40 percent of the entering classes failed to complete their degrees. Since then the attrition rate has fallen to below 18 percent in the Humanities and below 12 percent in the Social Sciences. There has also been improvement in retention rates in other programs, particularly in Business, Social Work and the Biomedical Sciences.

Students drop out for many different reasons. They may, for example, leave because they cannot complete the requirements of their programs, follow faculty who move to another university, decide that programs at other institutions are a better fit for their interests or change their career objectives. Others are unable to afford to continue to pursue their degree, are lured away by offers of lucrative positions outside of academia or are discouraged by a difficult job market. Still others depart for a wide range of personal reasons.

While the trends apparent in graphs on attrition rates cannot, therefore, be explained by any single cause, enhancements in the funding packages students receive in the Humanities, Social Sciences and Social Work have been one of the most important contributors to the decline in their attrition rates. As the next section of the self-study will discuss in detail, the Humanities and Social Sciences had a longstanding practice before the late 1990s of admitting large numbers of unfunded or underfunded students with the expectation that a significant percentage would drop out. With the transition to full funding, these programs became more selective in their admissions, enrolling smaller classes of students of high quality who had a greater probability of both meeting the requirements of their programs and of pursuing academic careers. The guarantee of five years of funding also reduced the likelihood that they would drop out for

purely economic reasons. Improvements in student funding in Social Work since 2002 have had a similarly positive effect on its attrition rates.

A second positive trend in the attrition statistics for the Humanities and Social Sciences has also occurred over the past decade. Besides losing fewer students, the programs are finding that those who leave tend to drop out at an earlier point in their studies. This is shown by the data in Table IX-3. In addition, the variability in time spent in the programs prior to dropping out has diminished, as shown by values of the standard deviation for each entering class included in the Table. As with the attrition rates themselves, there can be multiple explanations for the higher time-to-attrition through the late 1990s and its subsequent decline. However, in this case as well, the introduction of guaranteed multi-year funding appears to be an important contributor to the changes seen in the data for the Humanities and Social Sciences.

X. Funding of Ph.D. Students

Columbia does not have a single system for funding Ph.D. students. The amount of support students receive and its duration are determined by the schools with budgetary authority over the programs. Most schools either provide multi-year funding packages or are moving in that direction. However, student funding varies among the schools and even among departments within some schools, depending upon their resources, the disciplines they cover, competitive pressures and their histories.

Table X-1 provides a summary of the funding arrangements in the schools. In this section of the self-study, we will focus first on funding in the Arts and Sciences where almost two-thirds of the Ph.D. students are enrolled. A discussion of the financial support offered by the other schools follows. Finally, we will examine the question of how the funding plans affect the competitiveness of the Ph.D. programs.

Arts and Sciences

Doctoral students in the Natural Sciences have been fully funded since the 1960s through a combination of general income from the Arts and Sciences budget, charges to external grants and contracts, and, prior to 1997, tuition exemption from the University's fringe pool. While there have been some differences among the departments, the funding plan created a largely uniform level of support for all students in the Natural Sciences for a minimum of five years and a maximum of seven.

In contrast, the Graduate School of Arts and Sciences provided limited funding in the Humanities and Social Sciences well into the 1990s, giving financial support only to the better students and sometimes for only one year at a time. Inherent to this system was the need to admit students in large numbers with the expectation that a significant percentage would drop out for purely financial reasons. As early as the 1970s, the Graduate School sought to improve the financial packages it offered in those disciplines, but progress proved slow and difficult due to its dependence on the tuition generated from the self-paying students. Indeed, the number of self-paying students actually increased to help the Arts and Sciences meet its budgetary needs.

While the Graduate School remained heavily reliant on self-paying students, most of its peers at other universities moved to fully funded programs in the Humanities and Social Sciences that were smaller in size and not financially dependent on tuition income. As a result, Columbia's programs in those disciplines had a lower ratio of funded to unfunded students, lower applicant yields, higher levels of attrition and a longer average time-to-degree than their peers. By the mid-1990s, the Graduate School found itself at a disadvantage in the Humanities and Social Sciences in competing for the best applicants because it did not offer multi-year fellowships to all of its incoming students. Other factors exacerbated the School's problems. In the early 1990s, the University capped the amount of tuition exemption it was willing to provide to support student officers of instruction and research as part of an effort to contain escalating benefits costs. Subsequently, two decisions by the federal government effectively cut its contribution to the funding of Ph.D. education at Columbia.

In 1997, the government disallowed the University's practice of treating the tuition remission granted to student instructors and research assistants as a fringe benefit. This meant that the University could no longer use its fringe benefits accounts to socialize those costs across its entire wage base. Changing to a system of charging tuition waivers as a direct cost created a large deficit in the Graduate School's budget. The Provost shifted more than \$3.8 million into the budget of the Arts and Sciences to help meet the added financial burden produced by the government's decision, but the Arts and Sciences still had to reallocate another \$8 million to maintain the existing level of funding.

In a separate decision, the National Institutes of Health started in 1996 to limit their support for graduate student tuition and stipends to a level that was less than Columbia was charging to grants and contracts. The net effect was to reduce NIH funding for students from training grants by over 38 percent per student at the University. In combination with the government's directive to stop treating the tuition of student officers as a fringe benefit, the impact on the funding from NIH research grants was even larger, cutting the support students received from those sources by over 47 percent. While the programs in the Biomedical Sciences were hardest hit by this reduction, the Arts and Sciences, and Engineering to a lesser degree, were also adversely affected.

Finally, the University's location has proven to be a mixed blessing. Despite the City's growing attraction, the cost of living in New York has made it more expensive to study here than at many of our peers. Most specifically, the prosperity of the 1990s produced rising housing costs in Manhattan that priced apartments on the open rental market out of the reach of most

graduate students. They, therefore, turned to the University's considerable but still limited stock of housing in numbers that became increasingly difficult to accommodate.

To provide their students with greater financial security, some departments in the Humanities and Social Sciences began to offer some multi-year fellowships as far back as the early 1980s. Progress in that direction accelerated with the receipt of a grant in 1990 from the Andrew W. Mellon Foundation that the University used to support multi-year fellowships in six departments – Anthropology, Art History and Archaeology, English and Comparative Literature, Music, Philosophy and Religion. However, none of these initiatives could fund all of their students or even provide a uniform number of years of support for those who did receive multi-year fellowships. Mellon funding, moreover, expired after ten years and needed to be replaced. As recently as 1996-97, therefore, more than half of the students in the non-science programs within the Arts and Sciences could not count on guaranteed financial help with their tuition and living expenses.

In that year, the former Dean of the Graduate School, Eduardo Macagno, proposed moving at least 90 percent of the students in the Humanities and Social Sciences to a full-funding model over a 10-year period. The new full-funding plan was projected to require additional investments in the Ph.D. programs in excess of \$2 million. While the elements of the funding plan now in place largely adhere to Dean Macagno's proposal, its implementation occurred much faster than he anticipated, because the yields among applicants who were not promised funding deteriorated in the late 1990s. By 2001, every new student was either offered five years of support or admitted without funding in the first year but given four years of support

thereafter. With the class admitted in 2004, 97 percent received a five-year fellowship and the remaining three percent, four years.

For students in the Humanities and Social Sciences, the new funding system pays tuition, a nine-month stipend and currently a summer fellowship for at least one year. The goal of the Graduate School is eventually to award two years of summer support to all of the students in those programs. The funding package also pays the full cost of basic health coverage for the students, provides a 50 percent subsidy for those who wish to upgrade to the University's comprehensive health insurance plan, and includes a 50 percent subsidy for the health coverage of spouses and children. In their first year at Columbia, students in the Humanities and Social Sciences receive their funding entirely as a fellowship. During the next three years, they engage in teaching as part of their educational training before receiving a final year of dissertation support. There are some variations to this general model. In English and Comparative Literature and in Theatre, for example, students have a six-year funding guarantee because they participate in teaching as part of their programs in the second through the fifth year.

In the Natural Sciences the standard package includes a twelve-month rather than nine-month stipend, tuition and the same health benefits provided to students in the rest of the Arts and Sciences. After their first year of study, students are typically supported from the grants of their doctoral supervisors. Mathematics and Statistics are the exception to the prevailing pattern because their faculty receive less external funding. In those programs, the students receive nine-month awards and are not eligible for summer support.

Any student in the Humanities and Social Sciences who teaches in the sixth or seventh year continues to receive the standard funding package. In the Natural Sciences, students supported on sponsored research awards after their fifth year also continue to be funded. In 2004-05, the Graduate School gave full fellowships to over three-quarters of the students in their sixth and seventh years. Most of those supported were in the sciences. With the exception of a few students who continue to teach in the undergraduate Core Curriculum, none are funded beyond their seventh year. The exceptions will be phased out by 2007-08.

All Ph.D. students in the Arts and Sciences programs who want to reside in University housing are assured of accommodations for a minimum of five years, with possible extensions to seven. As will be discussed in a later section of the self-study on housing, their rents compare favorably to the amounts charged for comparable apartments in the Manhattan real estate market.

In addition to adopting a multi-year full-funding program in all departments in the Arts and Sciences, the Graduate School has significantly increased its standard ninth-month stipend over the past decade. Between 1996-97 and 2005-06 the nine-month stipend has grown by 76 percent from \$10,800 to \$19,000. The standard twelve-month stipend is equal to the nine-month stipend plus one-third. For 2005-06, it is \$25,327. The Graduate School could not have financed this growth on its own. It received additional revenues from the Arts and Sciences and incremental central funding from the Provost. Thus, the multi-year funding plan and the growth in stipends reflect the institutional priority that both the Arts and Sciences and the central University leadership have placed on strengthening the Ph.D. programs.

Funding Outside of the Arts and Sciences

Outside of the Arts and Sciences, financial support for Ph.D. students varies. As Table X-1 demonstrates, the programs in Architecture, the Biomedical Sciences, Business and Journalism provide their Ph.D. students with multi-year fellowships, although there are differences in the amount of the support and the number of years for which it is guaranteed. In contrast, Engineering, Public Health and Social Work do not guarantee all incoming students multi-year funding. However, over time they have brought their funding packages into closer alignment with the full-funding model and recognize the need to make further improvements in the future.

The Graduate School of Architecture, Planning and Preservation adopted the five-year model of the Graduate School of Arts and Sciences for its Ph.D. program in Architectural History and Theory in 2003. Following a review by the Executive Committee of the Graduate School of Arts and Sciences, Urban Planning introduced the same financial package for its incoming students in 2004, with financial support from the Provost as well as internal School funding. In addition to a \$19,000 stipend and full tuition, the School pays for the full health care costs of its Ph.D. students, including upgrades to the comprehensive health insurance plan and half of the premiums for family coverage. It does not offer summer fellowships but does pay for summer language courses. Because students in both programs are admitted after obtaining the Master's degree, the School does not continue students' stipends after their fifth year, but it does cover the cost of tuition and health care until the completion of their degrees.

The Biomedical Sciences programs have given their students multi-year fellowships since the 1960s that provide a level of support similar to the package in the Natural Sciences. The 12-month living stipend is a little higher – \$26,520 – and, with the exception of those in Biochemistry and Biomedical Informatics, students have no teaching obligations. The students receive health coverage for themselves at no cost but no assistance in paying for the coverage of family members.

Business has offered multi-year fellowships for the last three decades. Since its students have no teaching obligations, the School expects them to complete their degrees in less time than their counterparts in the Arts and Sciences. It, therefore, guarantees only four years of support that includes a 12-month stipend, now set at \$21,000. It does pay for an additional year of health coverage for students who take longer than four years. In addition, the Dean has started to provide the divisions with supplemental allocations to provide full or partial support for some of those in their fifth year to permit them to complete publishable articles before entering the job market and thereby greatly enhance their prospects of obtaining academic positions at the best universities. However, the additional fellowship money is not guaranteed.

Journalism has phased its guarantee of funding in over the lifetime of the program in Communications. When the program began in 1998, every admitted student received some support, but it was less than a full package. In the succeeding years, the School brought its financial support more closely in line with the Graduate School of Arts and Sciences model. By 2005, every incoming full-time student received a package that includes three years of tuition, a stipend, currently set at \$19,000, and basic health insurance. After the third year, the School

pays for tuition and health insurance for an additional two years. While it does not guarantee a stipend after three years, it arranges for instructional appointments in the Arts and Sciences for about 60 percent of its advanced Ph.D. students, with the cost split between the School and the Graduate School of Arts and Sciences. There are likely to be opportunities for further instructional assignments within a two-year Master's program the School opened in 2004.

Engineering does not have a School-wide system for funding its Ph.D. students. It leaves the decision on whom to support to the departments. While none of the departments guarantee funding to all of the applicants it accepts, most do not admit without knowing that the students will be supported throughout their studies. Some students come to the School with funding in the form of an external fellowship or financing from the companies at which they work. Most, however, receive support through a combination of money from departmental or School fellowship funds, appointments as teaching assistants distributed by the Dean's Office and external research awards. The exact combination and the years in which the different sources contribute vary among the departments. Effectively, however, most Ph.D. students in the School receive a financial package that includes full tuition and a stipend throughout their studies. The stipends in Engineering tend to track the amount the Graduate School provides, but are larger in size in some of the departments, such as Computer Science, and smaller in others. In 2005-06, they range from \$17,250 to \$20,835 for nine months. Most of these departments also subsidize the health insurance of their Ph.D. students, and all provide summer support. There remains, however, a small percentage of Ph.D. students in Engineering who are not funded from the point of admission. Once they have decided on an area of specialization and found a doctoral mentor,

they are supported for the rest of their studies, but for the first year or two they must pay for their education.

Public Health also does not offer standardized funding packages to its incoming students. However, the School has sought in recent years to reduce the size of the incoming classes while expanding its external sources of support for doctoral education. Together, these strategies have generated a larger pool of financial aid for a smaller number of students. Currently, the programs in the School provide over two-thirds of their incoming students with tuition and a stipend similar in amount to the stipend in the Graduate School of Arts and Sciences. Most of the remainder receive partial support in the form of full tuition and smaller stipends ranging in size from \$4,000 to \$8,000. There are, however, about 5 percent who are admitted without funding. After the first year, most students move onto the grants of their Ph.D. mentors for the remaining years of the educational programs. However, the School does not guarantee their funding since it comes from externally sponsored research awards and training grants whose continuation cannot always be assured. The minority of students who do not have full funding typically receive partial packages of the type described above for first-year students.

Since 2002, Social Work has not admitted any Ph.D. students without some assurance of financial aid. Using a combination of sources internal to the School and a grant from the University's Academic Quality Fund, it has offered half of each new class since then a minimum of two years of support consisting of full tuition and a stipend that is now \$15,000. Students do not, however, receive assistance with health fees. The rest receive partial financial support that varies in value depending on its source. Typically, these students receive a stipend, now valued

at \$14,000, plus partial tuition support. Funding from the Academic Quality Fund will be phased out by 2006-07. The School is committed to finding new sources of funding, not just to maintain the status quo but to expand the support it offers to match its peers, many of whom now provide three to five years of fellowships. In 2005-06, for example, it started to offer partial tuition support for students in their third year of study. It is also seeking to augment students' current financial aid packages by expanding the funding they receive from externally-funded grants.

Effects of Funding on Competitiveness and Quality

Four-fifths of all Ph.D. students – those in the Arts and Sciences, Architecture, Biomedical Sciences, and Business – are guaranteed funding at the time of admission for their entire expected period of enrollment. Adding in those in other schools who are supported throughout their studies, the percentage of fully funded students rises to well over 90 percent. Only a small minority of Ph.D. students, therefore, do not receive full financial support throughout their careers at Columbia. Though small in number, they are a serious concern for the schools themselves, the Dean and Executive Committee of the Graduate School, and the Provost. All recognize that the absence of secure funding adversely affects the students and reduces the University's competitiveness for the best applicants.

A 2002 report by the Executive Committee of the Graduate School captured those concerns:

A decrease in the quality of any one of our Ph.D. programs damages all the others, insomuch that the public, in particular, our students and our alumni, do not understand the minute distinctions in the Columbia administrative structure. Now quality is primarily measured by the quality of the academic programs and of the faculty. However, the ultimate measure of quality of a program is the stature of the students who are trained in the program, and that is in great measure determined by the quality of the students who can be attracted to the program. This, in turn, depends on the conditions of support of the students. In a period of rapid increase in support packages, it is important that we not allow any programs to fall behind the national standards in their field.

With the goal of rationalizing Ph.D. student support, the Committee recommended the use of “the Arts and Sciences norms of support as the norm for the other schools.” Among its specific proposals, the Committee recommended:

All Ph.D. students who do not have outside support and who request financial aid should receive tuition fellowships at least during the 4 or 6 semesters of full tuition (depending on whether a Masters is required on entrance to the program or if the student has received advance standing), and preferably during the first five years of the program.

These recommendations were echoed in the report last year of the accreditation Subcommittee charged with examining the organization and resources of the Ph.D. program:

In view of the significant improvements in doctoral program quality when a uniform guaranteed level of full support (tuition, fees and stipends) is provided to all admitted Ph.D. students for a five-year period, we recommend that the University set a goal for all Ph.D. programs to adopt this standard.

As part of its work, the Subcommittee also collected information from the schools on the funding practices of their peers. The Subcommittee was able to draw only general conclusions because of the difficulties inherent in comparing our own funding plans with those of other institutions – the lack of exact equivalence between the requirements and costs of the different

programs, the considerable variations in funding here and at other universities, differences in the cost of living in their respective locations, and the understandable reluctance of our peers to share detailed information about their practices.

Funding in the Arts and Sciences appears to be comparable with that at most of its peers in terms of years of guaranteed support, tuition coverage, stipend levels and health benefits. The Graduate School does not appear to offer as generous summer support in the Humanities and Social Sciences, but so far that has not affected its ability to attract and retain outstanding students in those disciplines. Outside of the Arts and Sciences, the picture is mixed. Those programs with full funding appear to be fully competitive, but those that have yet to adopt that model find themselves under constant pressure from peer programs that offer more generous, guaranteed packages to their students.

Statistics on applications, yields and attrition also offer an indication of the effects of the funding mechanisms the schools have adopted. These were discussed in earlier sections of the self-study. However, it is worth noting again that as funding has improved, applications have increased; yields have risen; and attrition has significantly diminished. Other factors undoubtedly contributed to these trends, but the availability of better funding has made Columbia a much more attractive place to study.

XI. Housing

Unlike most of its peers, Columbia maintains a substantial stock of housing for its faculty and graduate students. The University leases apartments in over 160 buildings to close to 8,500 faculty, staff and graduate students, many of whom have spouses or partners and children living with them. The current value of its residential properties exceeds \$960 million. It is difficult to specify the percentage of the total housing investment that is devoted to graduate students because some buildings are used by both students and faculty and the value of individual buildings varies widely depending on their location, size and condition. However, since graduate students (including those studying for either the Master's or doctoral degree) occupy about two-thirds of all Columbia apartments, it is fair to say that the need to house them drives, to a very significant degree, the University's real estate investments.

Columbia has invested so heavily in graduate student housing due to its location in one of the tightest, most expensive real estate markets in the country, Manhattan. The University houses over 2,300 new graduate students each year, including approximately 300 new Ph.D. students. Almost all of them arrive in August and September. With a vacancy rate of less than two percent, the private real estate market in Manhattan cannot accommodate so many additional renters in such a concentrated period of time. Students, moreover, are at a great disadvantage in competing for the available apartments with other potential renters who earn salaries that are larger than the stipends the University provides. Finally, the cost of apartments in the areas near to campus is beyond the means of most graduate students. For example, the average rent for

studios on the West Side of Manhattan is now \$1,850 per month, while one-bedroom apartments, on average, rent for \$2,800.

Graduate students, therefore, cannot rely upon the private housing market in Manhattan. Nor is a strategy of commuting from more affordable locations a viable alternative. Columbia does not provide graduate students with parking and public lots are expensive; driving in Manhattan is difficult; and the public transportation system, as good as it is, does not provide the convenience students need, especially when they stay on campus late into the evening.

In these circumstances, providing affordable housing is an indispensable component of the University's strategy for attracting and supporting Ph.D. as well as other graduate students. Without it, many would choose to attend other universities located in areas where accommodations are more plentiful, cheaper and within easier reach of the institution.

Supply

Graduate student housing outside of the Medical Center is managed by the Office of Residential Operations (formerly known as Institutional Real Estate, or IRE), which reports to the University's Executive Vice President for University Facilities but works closely with the Provost and the deans in assigning apartments. Graduate student housing at the Medical Center is a smaller operation that is managed by the Office of Housing Services, reporting to the campus' Vice President for Administration. As of October 2005, Residential Operations housed

4,475 students enrolled in graduate programs in schools on the Morningside campus. The Medical Center provided accommodations to another 1,100.

The supply of housing for Morningside graduate students has expanded in recent years, permitting Residential Operations to increase its student rentals by almost 12 percent between 1999 and 2005. New construction and leases account for a portion of the growth. Most recently, Residential Operations added 63 beds in 2002 by renovating one of its buildings, and the University opened a new residence hall for Law students in 2003 that freed up over 100 additional spaces previously assigned to the School in buildings managed by Residential Operations. Primarily, however, the additional supply has resulted from the departure of tenants without a Columbia affiliation who had leased their apartments before the University acquired their buildings. Under New York City's rent laws, they were permitted to keep their apartments after the change in ownership. Partially offsetting these increases has been the need to convert some apartments to undergraduate use.

There are no current plans to expand the supply of graduate student housing through new construction or leases. For the foreseeable future, however, Residential Operations does expect to gain 30-40 additional beds each year as non-affiliated tenants leave their apartments. Since the Medical Center has fewer statutory tenants, it cannot rely upon their departure for a similar supply of new units.

While substantial in size, the supply of graduate student housing is exceeded by demand. In Fall 2005, Residential Operations was able to accommodate 66 percent of the applications it

received for new housing. In recent years, moreover, the percentage of applicants it has accommodated has declined as the short supply and high prices on the private real estate market have driven an increasing number of graduate students to look to the University for housing.

Particularly in short supply are accommodations that are suitable for couples and families. Half of Residential Operations' graduate student accommodations consist of shares, in which single students live in apartments with others to whom they are not related. (Even in shared units, however, every student has a private bedroom.) Another 16 percent are dormitory-style rooms. Among the Residential Operations units that are not shared, only half contain one bedroom and only six percent are two-bedroom units; the rest are studio apartments. Therefore, Residential Operations often can only offer couples and families units with less space than they desire. It is seeking to expand the supply of apartments suitable for them, but the improvements it can achieve are limited due to the constraints on the total supply and the growing demand. The Medical Center has a supply of one-bedroom apartments that permits it to house about 75 percent of the students who apply for space suitable for couples. It does not accommodate families since it uses larger apartments as shares for single students.

On the Morningside campus, the imbalance in supply and demand has primarily affected Master's students. Any Ph.D. student in the Arts and Sciences, Engineering and Business who wants to reside in a University apartment is housed. Ph.D. students in the other Morningside programs do not have a similar assurance of housing, nor do those in the Medical Center. Nonetheless, Residential Operations and the Medical Center Office of Housing Services accommodate over 90 percent of all Ph.D. students who apply.

Quality

The University has made substantial investments in the quality of its housing stock over the past 25 years. Residential Operations' capital budget is now over \$35 million a year. In addition, it annually spends over \$3.5 million in operating funds to clean, paint and make the minor repairs needed to prepare vacant apartments for new tenants. Graduate students have materially benefitted from these investments.

About two-thirds of Residential Operations' capital budget, \$23 million, is devoted to upgrading the aging infrastructure of its buildings, most of which are more than 50 years old and some more than 100. In making infrastructure improvements, Residential Operations does not target buildings used by either graduate students or faculty. It undertakes them as they are needed. Since about two-thirds of Residential Operations tenants are graduate students, \$15 million represents a reasonable estimate of annual capital expenditures currently devoted to improving the infrastructure in buildings in which they reside.

Another \$3 million in capital funds is spent each year on renovating the interiors of graduate student apartments. As those apartments come vacant, Residential Operations will make improvements that go beyond cleaning and a new coat of paint by, for example, installing new kitchens and bathrooms. It also enhances some apartments by reconfiguring their layout, combining rooms and even combining apartments.

The Medical Center Office of Housing Services is following a different strategy for dealing with a similar backlog of deferred maintenance. It has developed a 10-year plan to make major capital improvements in the infrastructure of its buildings while funding annual investments in the refurbishment of apartments and some smaller capital projects, such as lobby and corridor upgrades, from its operating budget.

The Graduate Student Advisory Council (GSAC) has conducted two surveys of its constituents' opinion on the quality of the services they receive, including housing – one in 1998-99 and the other in 2003-04. Although the students had many complaints about housing, especially about the allocation process and rents, they seem to be generally satisfied with the quality of the housing they obtain. In GSAC's 2003-04 survey, for example, a majority of respondents rated their housing as excellent or good.

Allocation and Rental Process

While Residential Operations manages the rental of graduate student apartments, it is the schools that decide who receives them. Each Spring, Residential Operations makes an estimate of the number of vacancies it will have the following Fall. These are divided among the schools on the Morningside campus according to their percentages of the total applicants in the preceding year who registered as new full-time students. After receiving their allocations, the schools notify Residential Operations of the students whom it should house.

Approved applicants may view the available apartments and make their own selections. However, about 80 percent allow Residential Operations to assign them accommodations, largely because they are still living at considerable distances from New York City when the decisions are made on who will be housed in which apartments. Residential Operations makes those assignments based on the preferences expressed by the incoming students. Among the factors it considers are the type of unit requested, the rent the students would like to pay, whether they prefer a furnished or unfurnished apartment and when their academic programs will begin. For apartment shares, it also considers gender, smoking and school of enrollment.

The Medical Center does not have an allocation system. Incoming single medical students are assured accommodations in a dormitory. Other students in the Medical Center compete on an equal basis for a limited pool of apartments. Applications are sorted based on whether the students want single housing or accommodations for a couple. They are then prioritized based on the distance the applicants live from campus and when their applications were received. Assignments are made by matching the available units with the stated preferences of the students. The staff of the Office of Housing Services strives to house an applicant in one of his or her top three choices. Students who are not satisfied with their assignment can apply for a transfer beginning in mid-September.

The process of making housing assignments is one of the primary sources of student complaints about Columbia's housing system. Some of the tension is unavoidable. Since Residential Operations and the Medical Center Office of Housing Services must allocate a scarce resource, they cannot satisfy the wishes of everyone they serve. In the case of Residential

Operations, moreover, the housing decisions are made in a short, intense period of about eight weeks in late Summer and September, during which the wait can be considerable and the Residential Operations' staff can spend only a limited amount of time with each student. Adding to the students' unhappiness is a lack of transparency to Residential Operations' policies that often creates misunderstandings and the widespread sense that the Residential Operations' staff is insensitive and unhelpful.

Residential Operations and the Graduate School are seeking to reduce the stress Ph.D. students experience in their search for accommodations. Working in consultation with GSAC, for example, they now fund two doctoral students a year to serve as Ph.D. Student Housing Coordinators. These students spend 20-30 hours per week in the Residential Operations office helping new Ph.D. and M.A. students navigate the University's system of housing assignments and rental contracts. The Coordinators in 2005 were fluent in the languages spoken in the People's Republic of China and Haiti. While they worked with any Ph.D. or M.A. student in need of their assistance, they proved to be particularly effective in helping incoming international students.

Further improvements will result from the recent consolidation in August 2005 of the predecessor of Residential Operations – Institutional Real Estate – with the Office of Facilities Management which was responsible for the University's campus facilities. The creation of a single organization, Columbia University Facilities, under the direction of a new Executive Vice President will permit the University to manage its academic and residential facilities in an integrated manner. The new organization will be able to formulate a strategic approach to the

core issues affecting University properties and to use more effectively the combined technical resources of the offices it replaced. It is also committed to enhancing the services it provides and to improving communications with the University community. It is too early to cite specific improvements that will result in graduate student housing from the reorganization. Nonetheless, Columbia University Facilities has begun to reevaluate its management of that housing and expects to make changes in the near future that will enhance services Residential Operations offers to graduate students.

Access to Housing

Cutting across the differences in Ph.D. funding described in the previous section of the self-study is a different pattern of variations in access to student housing. The Graduate School, Business and Engineering, as already noted, give the highest priority to their Ph.D. students in deciding how to distribute their housing allocations, with the result that any of their students who want University housing will receive it. Architecture, Journalism and Social Work, which are heavily dependent on their Master's programs for their revenues, either give first priority to those students or equal priority to both groups of students based on proximity to New York and the date of application. As a result some of their Ph.D. students may not be housed.

As described above, Ph.D. students in the Biomedical Sciences must compete with those in the other Health Sciences programs, with the exception of single medical students who are assured of dormitory accommodations, for a smaller pool of apartments. In recent years, the Medical Center Office of Housing Services has housed all Ph.D. applicants from outside of New

York City who are single but only about three-quarters of those with spouses or domestic partners. In contrast, few local Ph.D. students are housed, and the Office does not accommodate families.

Students who do not obtain University housing may obtain assistance from the Off-Campus Housing Assistance Office (OCHA) in searching for non-Columbia rentals in the New York metropolitan area. There is no charge for its services. OCHA maintains an on-line registry of listings of non-Columbia-owned rooms and apartments available for lease, sublet, or share. In addition, it conducts workshops on hunting for apartments and provides individual consultations to students in need of advice on finding rental housing. Further information on OCHA may be found at <http://www.columbia.edu/cu/ire/ocha/>.

Rents

Residential Operations and the Medical Center Office of Housing Services determine the rents they charge for student housing by using formulas that take into account many variables including the apartment's square footage, furnishings (if any), whether the utilities are included in the rent, building location, floor level and whether the building has an elevator, door attendants, central air and an ethernet connection to Columbia's campus network.

Since the availability of affordable housing is an indispensable component of the University's strategy for recruiting graduate students, both offices charge rents that are substantially lower than those for comparable apartments (those of similar quality in comparable

neighborhoods) on the open market. Nonetheless, Ph.D. students still spend a higher percentage of their stipends on rents than their counterparts at most other universities. According to information GSAC has collected, rents are substantially higher than those paid by students at our Ivy League peers despite the University's efforts to ameliorate the high cost of living in Manhattan. This places many students under considerable financial stress. For students who are not fully funded, the cost can be prohibitively high. Some simply cannot afford to live in University housing even when it is available.

XII. Health Plans

The Health Services at Columbia (HSC) provide medical care, psychological counseling, health education and other services to over 20,000 students. (They also provide limited services to faculty and staff.) These include all students on the Morningside campus plus those at three affiliated institutions – Teachers College, Union Theological Seminary and Jewish Theological Seminary. HSC also sees students at Barnard College, another affiliated institution, when its Health Services are closed during the summer and winter breaks. Students in the Medical Center receive their health care through a separate office, but HSC assists them in emergencies when they are on the Morningside campus.

Coverage

HSC offers primary care on-campus through a full-time staff of more than 25 physicians, nurse practitioners and other health care clinicians who are organized into three practice groups. This structure allows students to see the same health care providers throughout their studies at Columbia. In addition, a trained staff of 27 psychiatrists, psychologists and certified social workers are available to counsel students individually and in groups. HSC does not have a limit on the number of times its counselors will see a student, but it does evaluate a student's needs after no more than eight visits. Most who need further care are referred to a large network of off-campus psychological counselors, but some will continue to see members of the Columbia staff throughout their studies at the University.

HSC also offers medical insurance, underwritten by Aetna, to help students on the Morningside campus with health-care needs it does not meet through its on-campus facilities. The insurance gives students access to Aetna's nation-wide network of health care providers and assistance when they need medical attention while traveling abroad. It covers medical specialists, hospitalization, prescription medication, and other types of treatment. Students are required to enroll in the insurance program if they do not have comparable coverage from another source. Students may select either basic or comprehensive coverage. They may also obtain family coverage for spouses or same-sex domestic partners and eligible children. Students in the Medical Center have a separate insurance plan with Aetna which provides one level of coverage.

HSC publishes detailed descriptions of its health plans on-line at <http://www.health.columbia.edu/ins/index.html>. Printed copies will be included in the materials we will make available to the members of the committee during their visit to the University.

Other Services

Besides providing clinical care to students on the Morningside campus, HSC directs other, University-wide programs. It conducts an active education program to help students make healthier life choices, including an award-winning Internet service, *Go Ask Alice!*, where students and others can easily obtain answers to their health questions. It also offers an array of workshops, awareness campaigns and other initiatives designed to promote healthy behavior and

attitudes. Its Office of Disability Services works with the faculty and schools to accommodate the needs of students with disabilities. Its Sexual Violence Prevention and Response Program supports survivors of sexual assault and seeks to reduce the occurrence of sexual violence by educating the campus community about its dynamics and effects.

Usage

In Fall 2004 and Spring 2005, students made over 34,000 visits to the HSC for primary care and almost 11,000 for psychological counseling. In Summer 2004, they sought help on another 6,000 occasions. Given the manner in which it collects statistics, HSC cannot distinguish between Ph.D. and other graduate students. However, the statistics for the Graduate School of Arts and Sciences, which has over 70 percent of the Ph.D. students enrolled in a Morningside program, are a reasonable proxy for usage by other students studying for the doctorate on the University's main campus.

In 2004-05, students from the Graduate School made over 7,600 visits to the Health Services, the second highest among the schools on the Morningside campus after Columbia College. During the summer months, they were its most frequent users. Over 40 percent of the students in the Graduate School used the Health Services at some point in 2004-05. For many, who do not have spouses with alternative plans and can no longer obtain coverage through their parents, it is the sole source of health care support. For these reasons, almost two-thirds of the students in the Graduate School have also elected to participate in the University's health insurance plan. The School's students are also the most likely to obtain insurance coverage for

family members or same-sex partners, accounting for more than half of all students who take advantage of that feature of the University's plan.

Service Improvements

Over the past six years, HSC has made substantial changes in its health care plans. Some of the changes addressed specific complaints or recommendations students made in a survey by the Graduate Student Advisory Council in 1998-99 as well as the Office's own on-going evaluation of its operations. Others were made in response to changing conditions or opportunities in health care nationally or to implement innovative practices used by the Office's counterparts at peer institutions.

In 2002, HSC redesigned its primary care practice to enable students to see the same health care provider throughout their time at Columbia. Since 1999, it has changed the health insurance plan to expand coverage, improve benefits in key areas and reduce costs. Over the past three years, it has been moving to an electronic records system that improves the Office's ability to coordinate and deliver patient care. It also facilitates the scheduling of appointments, and enhances HSC's ability to offer effective public health programs.

Other changes are now in development. For example, with advice from its Student Health Advisory Committee, HSC's counseling staff is introducing a system of access that will assure that anyone seeking help for the first time will obtain an initial consultation quickly, usually within one business day. In addition, HSC has started to participate in a national survey

on the health and habits of students across the country. The Office anticipates using the resulting data to introduce new programs and develop customized approaches treating individual patients by both its primary care and psychological staffs.

Although Ph.D. students have responded positively to the recent improvements, some continue to criticize aspects of the care they receive. As discussed in an earlier section of the self-study, only 53 percent of the respondents to the Graduate School's survey of enrolled Ph.D. students were satisfied with the health services they receive from HSC.

Some of the sources of discontent, such as the rising cost of health care, the ceilings on prescription drug reimbursements under the basic insurance plan, and the lack of a dental plan, are caused by conditions external to Columbia. HSC has responded to those external conditions by offering as generous a range of options as it can, given the financial constraints under which it operates and the limited nature of the available alternatives. The students also find HSC's current physical facilities small and antiquated. These complaints are shared by HSC's staff. In 2004, the University's Trustees approved a 20-year strategic plan for the Health Services that includes funding for the creation of a much larger, more modern facility. Plans for the new facility are now in development.

Students with families find the health coverage available for their spouses or partners and their dependent children to be insufficient. In particular, they point to the fact that family members cannot use HSC's on-campus facilities and to coverage limits in the health insurance plan which they consider too low. Those who find dependent health coverage deficient often

express a broader concern with the support the University provides to graduate students with families. In addition to the problems they see in the health care plans, they cite the limited supply of graduate student housing appropriate for families, the absence of child care leaves for new parents and the lack of University daycare support.

Some Ph.D. students in the Biomedical Sciences and Public Health programs also find their health plans inadequate in comparison to the coverage HSC provides. This is particularly true for those who complete some of their program on the Morningside campus, during which they can use HSC's services. Although the two campuses have developed separate plans to meet different student needs and health care patterns, they are engaged in an on-going discussion to bring their plans into closer alignment.

Finally, as described in the section of the self-study on funding, Ph.D. students in different schools receive differing amounts of financial help in meeting the cost of their health care. Not all of the schools, even among those with full-funding plans, pay for health fees. Some, but not all, partially subsidize the cost of health insurance for members of their students' families. Some on the Morningside campus encourage their students to upgrade their insurance from the basic to the comprehensive plan by paying for a portion of the additional cost, while others do not. The students who are affected by these variations are understandably unhappy with them. From their perspective, they are students of the University, rather than of a specific school, and should receive health benefits that are comparable in quality and price to those of students in other schools.

XIII. International Student Services

With more than 4,000 international students, Columbia has the second largest international enrollment among the country's universities and colleges. As a proportion of its total enrollments, it ranks third. Among the group of universities the University considers its peers, it has the highest number and percentage of international enrollments at the graduate level. Four-fifths of the University's international students are enrolled in one of its graduate programs. As already noted in the section of the self-study on enrollments, the Ph.D. programs by themselves account for 30 percent of the University's international enrollments.

The strength of Columbia's programs, its international orientation, and its many formal and informal collaborations with institutions throughout the world all contribute to its attractiveness to students from abroad. Moreover, the University's long history of educating international Ph.D. students has established its reputation in many countries as a desirable place to study, while its international alumni have directed subsequent generations of students to their alma mater. The University has also benefitted from its location in New York City, one of the most cosmopolitan urban centers in the world. The ethnic networks created by the presence of significant populations of their compatriots in the City provide personal and social support that make the prospect of studying here attractive. This is especially true for Chinese students, but there are many other nationality-based organizations within the University and in the larger New York community.

International Students and Scholars Office (ISSO)

International students have a special set of needs in addition to sharing the academic experience of their American counterparts. Responsibility for helping them with those needs has been assigned to the International Students and Scholars Office (ISSO). The ISSO works directly with all international students on the Morningside campus and with international Ph.D. students regardless of their location. The Medical Center maintains a separate International Affairs Office to assist international students studying for other degrees, but it reports to the ISSO on matters relating to compliance with the rules and regulations of the Department of Homeland Security (DHS). As its name indicates, the ISSO also assists international members of Columbia's faculty and staff.

The ISSO has a staff of twelve professionals, ten of whom are authorized by DHS or the Department of State to deal with student visas. The Office provides a broad range of services designed to ensure that immigration questions remain routine and secondary so that international students can devote their full energies to their educational goals. It assists them in obtaining the visa documents needed to study here and in complying with DHS requirements once they have arrived. In addition, it provides information on Columbia to prospective international applicants and assists the schools in evaluating the qualifications of those who apply.

For students who are admitted, the ISSO offers in-depth orientation programs, including a required session on academic practices, and a rich range of special workshops, only some of which deal with immigration questions. Others provide practical help, such as instruction on

how to complete income tax returns, or focus on the development of personal skills, such as public speaking, writing and time management. Finally, the Office sponsors social and recreational programming to integrate international students into the Columbia community and help them, and accompanying family members, acculturate to New York.

Each year since 1992, the ISSO has surveyed international students about their use of its services and programs. Over 23 percent of the University's international students normally respond. In 2004, 960 completed the survey, including 305 studying for the Ph.D. Over three-quarters of the responding doctoral students gave the ISSO staff the highest possible rating. On a four-point scale, over 77 percent in 2004 awarded the staff a four while another 22 percent gave it a mark of three. The survey results for students studying for other degrees show comparable levels of satisfaction.

The responses to the surveys' more detailed questions show a similar high level of satisfaction. Over 90 percent of the Ph.D. students responding in 2004 indicated that they usually or always receive reliable information. Another 90 percent indicated that visits to the Office required no more than a half-hour, while a similar percentage of those who phoned indicated that they seldom or never encountered a busy line. Over 76 percent of those who dealt with the Office in person felt that they received consistently courteous attention; that percentage increased to more than 93 percent for those who communicated with the Office by phone.

Service Improvements

The high scores the Office receives in its annual surveys reflect the service commitment of its staff. They are, in addition, the product of its development of a sophisticated computerized system over the last 13 years. Known by the acronym of ISSIS (for International Student and Scholar Information System), the system maintains the immigration records of the international students entirely in an electronic form and permits the ISSO to generate electronically the immigration documents the students need and the reports that the University is required by law to transmit to DHS.

The first generation of ISSIS went live in 1992, at the same time the ISSO relocated to an office about 10 blocks from campus. The significantly longer trip to the Office made the immediate completion of as many transactions as possible its top priority. The ISSO's 1993 survey reported that only 13 percent of all documents were processed while students waited. Nine years later, the percentage had climbed to 91 percent.

The improvement in service delivery came to an abrupt halt on September 11, 2001. As mandated by Congress, the INS (which later became part of the Department of Homeland Security) introduced the Student and Exchange Visitor Information System (SEVIS) at the start of 2003 to track non-immigrants in F and J status. Since then, all immigration transactions have had to be processed through SEVIS. The immediate impact of having to rely on SEVIS' processing routines was to erode the ISSO's service delivery times. In 2002, 91 percent of the

international students' needs were met while the student waited in the Office. By 2005, that figure had dropped to 67 percent.

To offset the need for more office visits, the ISSO is implementing measures to reduce the number of times students must come to its Office for services not reliant on SEVIS. It is also using ISSIS' capabilities both to predict and provide electronically the specific information students need at various milestones in their educational programs without requiring them to come to the Office. To help international students navigate through the new immigration environment, the ISSO surveyed incoming students in Fall 2004 about their experiences with obtaining visas, entering the country and taking up residence at Columbia. The Office is using the resulting information to refine its procedures and is sharing the data it has collected with future incoming students to help them plan for their programs to Columbia. To aid the international students who are already here, it is expanding its outreach programs to demystify SEVIS and update them on changes in the regulatory environment.

XIV. Career Services

As they progress through their studies, students in Columbia's Ph.D. programs can count upon institutional support in their search for positions after graduation. Primarily, they can turn to the faculty, and their Ph.D. advisors in particular. In addition, the University's Center for Career Education has expanded its services for graduate students. While the Center is available to any Ph.D. student who wants its help, those in several programs, such as Business, Social Work, and Public Health, can, instead, use the specialized career services offices those schools maintain.

The education Ph.D. students receive prepares them for potential jobs ranging from faculty appointments at a university or college to non-academic positions in the for-profit sector that utilize the knowledge and skills they have acquired. In between are a variety of academic-related jobs, such as non-faculty appointments in higher education as either researchers or administrators, research-oriented positions in institutes or industry, non-profit work and jobs in government. The faculty play the more significant role in a student's search for academic positions, while the Center for Career Education assumes a more important function in looking for non-academic jobs.

Departmental Placement Assistance

The programs do not all handle academic placement in the same way. The variations among them reflect differences in departmental culture, history, size and the diversity of their

subfields, and in the expectations of the disciplines they cover. They also arise from the relative attractiveness of non-academic career alternatives and the annual cycles for filling positions in their fields.

There are, nonetheless, common elements in the efforts of the programs to assist their Ph.D. students in finding positions after graduation. Over time, those efforts have become more structured and sophisticated. Some programs still leave placement support to the advisor to handle in an informal manner. Most, however, work with their students earlier than in the past and with a widening array of support services. These include information on the search process and assistance in building a *curriculum vitae* that will attract attention. They also help their students identify potential openings and prepare for interviews and job talks. Finally, they support their students' applications for positions through letters, direct personal contact with members of the recruiting institution and other means.

The programs have broadened their involvement with the job search in response to an increasingly competitive job market. Universities and colleges are expecting more and more of applicants for academic positions. In many fields, students now need publications, conference presentations, teaching experience or other evidence of early academic achievement to gain notice and interviews. Due to the growing professionalization of job requirements, students must begin to build a portfolio early in their studies and prepare more systematically for the job market than in the past. Their departments and programs accordingly have needed to expand the support they provide. Moreover, a growing number of programs report that applicants for admission ask for placement data and use that information in making the decisions about where

they want to study. Therefore, in addition to assisting their enrolled students more effectively, the programs' expanded initiatives help to maintain their competitiveness for the best applicants in their fields.

As in the past, the faculty advisor remains the main source of support in job searches. Students also obtain help from other members of their dissertation committees and other faculty working in their areas of specialization. Much of the assistance these faculty provide consists of individual mentoring and using their disciplinary networks on behalf of their students.

The support of the faculty is augmented by a wide range of initiatives at the level of the department and school. In most, coordination of that broader effort is managed by the individual who supervises its graduate programs – the Director of Graduate Studies in the Arts and Sciences or an equivalent official in the other programs. However, in a growing number of departments and schools, another faculty member serves as a “placement” officer with responsibilities that focus on helping students find positions. In some, additional faculty are assigned to assist that officer; in a few, the placement officer receives course relief in order to manage his or her duties.

Many departments and schools integrate aspects of preparing for the job market into their curricula. While done primarily for educational reasons, this also helps students develop a track record of research and teaching that makes them more marketable. For example,

- To encourage students to think strategically about their career trajectories, the School of Social Work makes the discussion of the job market and academic careers a significant focus of the first-year seminar required of its incoming doctoral students.
- Political Science requires second-year students to deliver original research papers at a day-long series of meetings that mimic those held by its national association. Many of these papers subsequently serve as the basis for presentations at professional conferences.
- Departments and schools actively encourage their students to present at conferences in other ways. Many run workshops on conference presentations. The Graduate School assists Arts and Sciences students with the expense of traveling to conferences to deliver papers, and many of their programs augment the support it provides with additional funding. Business and Social Work have similarly set aside funds in their budgets for their students presenting conference papers. In the science and Public Health programs, students typically rely on their advisors to cover the cost of traveling to conferences from their grants.
- Collaborative work with the faculty that results in joint publications is the norm in the science programs. Depending on disciplinary culture, it also occurs in other programs, such as Business.

- Some of the science programs have made the preparation of a grant proposal one of their qualifying requirements.
- Science programs have their students present their research at weekly departmental seminars. In some, such as Industrial Engineering and Operations Research (IEOR), a departmental talk is a part of the qualifying requirements.
- Economics and Business have their students defend three publishable articles in lieu of a book-length dissertation manuscript. As a result, by the time they start actively to seek a position, many of their students already have papers accepted or under consideration for publication.
- As described in the section of the self-study on the curriculum, teaching is an integral part of the curricula of all 31 programs in the Arts and Sciences and in 14 of the 29 in the rest of the University. Besides learning skills that will help them in their future careers as educators, the students acquire experience that universities and colleges are increasingly coming to expect of new faculty.

The departments and schools have also developed initiatives to help their Ph.D. students once they are actively engaged in looking for a future position. For example,

- Many run seminars and workshops on the job market in their disciplines. As part of these seminars, former graduates, faculty at other universities and, sometimes,

- representatives from industry or the corporate world often talk to the students about their own experiences with the job market as applicants or recruiters.
- Some, such as Business, Political Science and Sociology, maintain departmental web sites with the *curricula vitae* and papers of students who are on the market. Economics also runs a dossier service for its students.
 - It is common for departments and schools to run practice interviews prior to the national conferences at which job interviews occur and mock seminars for those students who are invited to give talks at other universities. Most also have their Ph.D. students attend the talks of candidates for positions at Columbia in order to observe the process.
 - Once its students receive offers, the placement officer in English and Comparative Literature provides assistance in negotiating their recruitment packages. Representatives of other programs and, more commonly, the Ph.D. advisor offer similar support to their students.
 - The students in most of the science programs typically obtain postdoctoral appointments as their first positions after graduation. Since these are for a limited term of three-to-five years, the science programs and their faculty remain in contact with their graduates, assisting them in their searches for permanent positions at the conclusion of their training as post-docs.

In some disciplines, non-academic careers in industry, corporations, government or non-profit organizations offer attractive, even preferred alternatives to university teaching and research. In those fields, the departments and schools have expanded placement support to help students interested in those career paths.

- Many maintain web sites with information on job opportunities.
- Each year, Public Health holds a career fair at which prospective employers in its disciplines conduct interviews of its students. Similarly, Chemistry invites recruiters from the chemical and pharmaceutical industries to meet with its graduating students.
- Chemistry, Political Science and others receive job postings directly from non-academic employers. They publicize these opportunities directly to their own students and distribute them more widely through the Center for Career Education.
- Business, Statistics, Applied Physics and Applied Mathematics, and Industrial Engineering and Operations Research all have strong networks with the financial sector which they employ to help their students find positions in banking and other financial services professions.

Center for Career Education

The Center for Career Education complements the initiatives of the faculty with programming designed to help students define their career objectives, identify opportunities that match their goals and compete successfully for positions that interest them. According to its mission, the Center seeks

. . . to help undergraduate and graduate students learn about the relationship between what they do at Columbia and life after graduation, develop the career competencies required beyond classroom knowledge, to understand the forces at play in the global market and new economy, and their effect on the workplace, the workforce, and individual lives and careers, to make informed decisions about career goals, to find career opportunities related to their personal and professional objectives, and through their work to make a difference in the world.

The Center serves both undergraduate and graduate students. At the graduate level, it works with students in the Graduate School of Arts and Sciences, the Graduate School of Architecture, Planning and Preservation, the Fu Foundation School of Engineering and Applied Science, the School of the Arts and the School of Continuing Education. The first three of these schools enroll more than 80 percent of the University Ph.D. students. The Ph.D. students in other parts of the University either have access to specialized placement offices within their schools or depend on their departments for placement assistance.

Historically, the Center concentrated on serving undergraduates and provided only minimal assistance to graduate students, principally in the form of a paper-based dossier service which many elected not to use. The Center began to broaden its involvement with graduate

students after the appointment of a new Dean for Career Education in 2001. Under his direction, it created a separate department devoted exclusively to their needs, moved to a web-based dossier service, offered additional workshops, expanded individual counseling sessions for graduate students, and published a *Graduate Student Career Planner*, an informational guide written specifically to help graduate students make career choices and conduct job searches.

Despite these changes, the Center still had a limited relationship with the graduate students it was supposed to serve as recently as Fall 2004. As part of the preparatory work for this self-study, the accreditation Subcommittee on Student Services surveyed the Ph.D. programs about the Center. A majority of those responding reported that their students did not use the Center and that their faculty had little interaction with it.

This has now started to change. In November 2004, the same month in which the Subcommittee conducted its survey, the Center recruited a Director of Graduate Student Career Development, Dr. Richard Kurz, who has the Ph.D. as well as experience in career education in a university setting. Over the past year, Dr. Kurz has actively worked with the departments and programs to make the Center more relevant to their Ph.D. students. These efforts are on-going. This year, the department is conducting a series of surveys of students and departments to obtain a better understanding of their interests and needs. It is also examining the services provided at peer institutions to create benchmarks against which it can assess the effectiveness of its own programming.

The Center offers a curriculum of seminars, expert panels, career fairs, speakers and workshops that are similar in content to those provided by many of the departments and programs. Although this leads to some duplication of effort, it ensures that all Ph.D. students have access to information about the job market. It also ensures that students learn about generic “best practices” as well as discipline-specific information that will help them conduct their job searches.

The Center is also seeking to improve the quality of the counseling it offers to individual students. The counseling sessions vary in length and purpose. Some are devoted to helping students clarify their career objectives and may, in appropriate circumstances, involve psychometric testing as well as individual meetings with a counselor. Others are designed with more specific goals in mind – for example, to help students develop search strategies that utilize the skills they have acquired during their academic training, to build dossiers that present themselves effectively and to improve their presentation, interviewing and networking skills.

In addition, the Center has a wealth of informational resources for graduate students. These include the *Graduate Student Career Planner*, written materials on the search process, information about careers in specific industries and job listings. On-line, it provides links to a host of other websites devoted to specific types of careers. The *Graduate Student Career Planner* and a sampling of other materials will be available to the committee to review during their visit to the University.

Ph.D. Placement Statistics

As discussed earlier in the self-study, the goal of the Ph.D. programs is to provide their students with the knowledge and skills necessary to pursue academic or related careers in their respective disciplines. Primarily, the programs seek to produce scholars, researchers and educators who are capable of engaging in original, independent research and teaching at either the undergraduate or graduate level. In many disciplines, the training gained in obtaining a Ph.D. can also be used to pursue careers in both the private and public sectors. Accordingly, those programs define their career aspirations for their students more broadly to include those alternatives.

Information that the Graduate School has collected on the careers of almost 4,000 Ph.D. graduates from 1993 to 2004 indicates that the programs are realizing those objectives. These data are summarized in Tables XIV-1 and XIV-2. With the exceptions of the Biomedical Sciences programs, which systematically track the careers of their graduates in order to fulfill the reporting requirements of externally funded training grants, and Business, the data on first positions are incomplete. The records on current jobs are significantly better, and we have identified the positions of many of those with whom the programs have lost contact from information available on the internet.

At least sixty percent of all Ph.D. graduates currently hold positions in universities and colleges or other academically related institutions. Excluding those for whom we do not have information, that figure increases to 74.08 percent. Thus, between three-fifths and three-quarters

all of the graduates of the Ph.D. programs since 1993-94 now have academic or academic-related careers.

Those who have opted for alternative careers are primarily in the sciences where there is a consistent demand in the for-profit sector for individuals with the training the programs impart. For the most part, these graduates also engage in research. The only difference is the venue in which they work. Their concentration is highest in Engineering where a majority of the graduates for whom we have information have made that career choice. Most of these have positions in research labs of corporations in their respective fields. These range in size from start-up enterprises to large, well-established companies such as IBM, Microsoft, General Electric, Ford and Exxon/Mobil. Additionally, many Engineering graduates, especially those from Applied Physics and Applied Mathematics and from Industrial Engineering and Operations Research, pursue careers in the financial sector, engaging in research and mathematical modeling at investment banks and securities firms.

Similarly, at least 18 percent of the graduates from the Biomedical Sciences programs can now be found in research positions in biomedical and pharmaceutical companies. Other examples include the significant number of graduates from Chemistry who work in the chemical and pharmaceutical industries. Many from Statistics, Biostatistics and Mathematics have made their careers in the field of health care, software development, finance and banking, manufacturing and consulting.

Outside of the sciences, a significant number of graduates from the programs in Economics and Business have also gravitated to careers in investment banking, securities firms and other types of business in the financial sector. Graduates from other programs, particularly those in the Humanities, do not tend to concentrate in a particular industry. Many, however, have used the skills they have gained in their educational programs to pursue careers as writers, researchers and editors in publishing, the not-for-profit sector, consulting and public service.