

Special Emphasis Self-Study in Graduate and Professional Education¹
College of Pharmacy – Autumn Quarter 2006

Introduction to the College of Pharmacy

The College of Pharmacy was established in 1895 (originally founded as a School of Pharmacy in 1885) and has been among the leaders in pharmacy education, research and service throughout its history. The College's current vision and mission statements describe our core values, overarching goal, and indicators of success as follows:

Our Mission

The overall mission of the College of Pharmacy is to advance pharmaceutical care for the people of Ohio and the global community through our teaching, through our research, and through our service. The College will provide high quality education in the pharmaceutical sciences and pharmacy practice to professional, undergraduate, graduate, and postgraduate students through teaching, research, practice, and related service activities including outreach and engagement.

Our Core Values

*We value innovation, learning and the advancement and sharing of knowledge.
We value research and its application toward improving the use of medications in society.
We value pharmaceutical care and professionalism.
We value our students, faculty, staff, alumni and friends.
We value diversity in all of its forms.*

Our Overarching Goal

The Ohio State University College of Pharmacy will be among the world's truly great institutions of pharmacy education.

Our Vision and Indicators of Success

We envision the Ohio State University College of Pharmacy as being among the top ranked institutions of pharmacy education in the world. This vision encompasses a robust pharmaceutical science and clinical research enterprise with emphases in interdisciplinary scholarship. Our faculty will be viewed as leaders in the discovery, development, delivery and use of drugs, which will translate into innovations in pharmaceutical care. We see an outstanding cadre of graduate-research students who are fully engaged in our educational and research enterprises. We see a strong patient-centered, evidence-based curriculum for our graduate-professional students, which develops exceptional medication specialists. Our combined degree programs will be viewed as hallmarks of excellence. We expect to lead the country in post-doctoral residency and fellowship training. We will offer high quality undergraduate education enhanced through didactic, research and extracurricular experiences. Our student services will be regarded as a model within the University. Through partnerships in outreach and engagement, we will effectively translate our scholarship toward improving health outcomes for the people of Ohio and

¹ Prepared for the Higher Learning Commission of the North Central Association of Colleges and Schools.

beyond. Our alumni will be viewed as leaders in pharmacy practice, in pharmaceutical science, and within their communities.

The College currently offers the following degree programs:

- Bachelor of Science in the Pharmaceutical Sciences (BSPS)
- Doctor of Pharmacy (PharmD, Entry-Level and Non-Traditional)
- Master of Science and Doctor of Philosophy (MS and PhD in Medicinal Chemistry and Pharmacognosy, Pharmaceutics, Pharmacology, and Pharmacy Administration)

Combined degree offerings include PharmD/MS, PharmD/PhD, PharmD/MBA, and PharmD/MPH. Pharmacy practice and specialty residency programs are available in a variety of focus areas including institutional and ambulatory care emphases. Post-doctoral research fellowships are offered for PharmD as well as PhD graduates, and the College's Outreach and Engagement enterprise administers a number of service and continuing education initiatives.

Our faculty exhibits excellence in teaching, research and service. Twenty-one of the current 30 senior faculty members in the College are Fellows of national scientific or professional organizations. Our faculty authored 213 refereed publications and books during 2005-2006 and expended \$6.06 million for research, with approximately \$4.9 million in peer-reviewed grants and contracts received from the National Institutes of Health.

The College of Pharmacy is proud of its faculty, staff, students, and alumni, as well as its distinguished history in pharmacy education. We offer high quality programs at the undergraduate, graduate professional, graduate research, and postdoctoral levels. We are located within one of the most comprehensive academic medical centers in the country. We believe the Ohio State University College of Pharmacy to be a top tier institution² by any measure. Evidence to support this belief resides in opinion polls, the scholarly productivity of our faculty, local and national distinctions bestowed upon our faculty, students, and alumni, and the state of our teaching and research facilities.

Special Emphasis Self-Study in Professional Education in the College of Pharmacy

1. Description of the College's Professional Programs

The College of Pharmacy offers Doctor of Pharmacy (PharmD) curricula in two structures:

- an entry-level program designed as a first professional degree (following completion of program prerequisites and a baccalaureate program)

² The College of Pharmacy was 11th in the 2005 *US News & World Report* ranking of PharmD programs, 20th in total NIH funding (2005), and 2nd in a 2002 *Annals of Pharmacotherapy* report of faculty scholarship and citations for an overall ranking of 9th in the country.

- a nontraditional program designed for students who have earned the Bachelor of Science in Pharmacy degree (previously accredited for licensure as a pharmacist)

The entry-level program constitutes a full-time, residential, four-year professional doctoral curriculum. The first three years are primarily didactic in nature with required course sequences in the various pharmaceutical, clinical and administrative sciences. Students also engage in a Professional Experience Program including part-time introductory/intermediate experiences in the first and third years, and full-time advanced practice experiences in the fourth year. There are currently 461 students enrolled in this program. Admission is competitive, with an applicant-to-enrolled student ratio of approximately 8:1. Graduates from this program in 2006 (112 students) entered community/ambulatory pharmacy practice (67%), hospital pharmacy practice (10%), pharmacy residencies (10%), and other types of practices (8%).

The nontraditional program constitutes a distance-learning curriculum³ designed for working professionals. Enrolled students engage in a series of didactic courses on a part-time basis in drug information/literature evaluation, pharmacokinetics, pathophysiology and therapeutics. Subsequently, students participate in eight months of required experiential program rotations. There are currently 86 students enrolled in this program. The College's faculty has elected to discontinue the nontraditional program after 2007 admissions, as we feel that the initial mission of the program (to offer a distance-learning PharmD opportunity for our B.S. in Pharmacy alumni) has been satisfied.

2. Discussion of Broad Issues of Program Quality

The College's PharmD programs are fully accredited by the Accreditation Council for Pharmacy Education (ACPE), with our current certification extending through June 30, 2011. As a component of our last self-study for ACPE reaccreditation, the faculty rated each accreditation standard/guideline as "commend," "meets standard/guideline," or "needs improvement" and identified a number of action plans for programmatic improvements. These ratings and action plans relate to mission, planning and assessment; organization and administration; curriculum; students; faculty; library and educational resources; physical and practice facilities; and financial resources. The bulk of the 101 standards and guidelines were rated as "meets standard/guideline," with 22 rated "commend" and three rated "needs improvement." Those needing improvement related to our physical facilities, quality control for Professional Experience Program rotations, and courses in the pharmacy management sequence. Eighty-six action plans were constructed for improving these and other aspects of our programs, and responsible parties and expected timeframes for completion were defined. The College's Executive Committee is monitoring progress toward the completion of these action plans.

Among the most important indicators for the quality of any educational program must be the quality of its students and evidence that graduates have been well prepared for the professional world they will enter. Retention rates of PharmD students have exceeded 95% since the programs' inception. Admission statistics relating to mean

³ The Nontraditional PharmD Program was the first distance-learning degree program offered at Ohio State.

cumulative grade-point average and composite Pharmacy College Admission Test (PCAT) scores⁴ for the past three years are depicted in Table 1 below:

Table 1: Mean Cumulative Grade-Point Average and Composite PCAT Scores for Entering PharmD Students 2004-2006

Year	Number of Entering PharmD Students	Average Cumulative Grade-Point Average	Average Composite PCAT Score
2004	118	3.5	86 th percentile
2005	122	3.5	82 nd percentile
2006	120	3.63	85 th percentile

Pharmacy students must complete two examinations upon graduation for licensure: the North American Pharmacist Licensure Examination (NAPLEX) and the Multistate Pharmacy Jurisprudence Examination (MPJE). The pass rates for our graduates from 2004-2006 are depicted in Table 2:

Table 2: North American Pharmacist Licensure Examination (NAPLEX) and Multistate Pharmacy Jurisprudence Examination (MPJE) First-Time Passing Rates for OSU Graduates 2004-2006

Year	Number of First-Time OSU Candidates	Passing Rate NAPLEX	Passing Rate MPJE
2004	38	100%	100%
2005	84	100%	98.8%
2006	96	99%	99%

3. Discussion of Other Issues Relevant to Professional Education in the College

The College's action plans which emanated from our self-study for ACPE accreditation, as well as our current strategic plan (see details under "Recommendations for the Future") identify a number of critical priorities for the continuing advancement of our professional programs. Important among these are needed advancements in our facilities (teaching, experiential and research) and funding for professional education. Other relevant issues include diversity, interprofessional education, the development of future pharmacy faculty, and proposals to require residency training for pharmacists in the future.

The College's ACPE Self-Study and Strategic Plan both include emphases on diversity. In addition, the Dean's Advisory Committee on Diversity annually constructs a Diversity Plan to guide our efforts in this regard. The College has intensified recruitment

⁴ The College has evaluated and validated the use of student grade-point averages and PCAT composite scores as predictors of success in our PharmD program.

efforts, supported the OSU chapter of the Student National Pharmaceutical Association (SNPhA, the national minority pharmacy student association), evaluated our climate for diversity and learning, recognized distinguished efforts within our College community to enhance diversity, developed relationships with minority institutions, and initiated a development campaign to provide a resource base to increase scholarships, student research funding, and faculty support.

Healthcare in the United States is increasingly become collaborative in nature. Pharmacists, physicians, nurses and other health professionals are expected to practice in interdisciplinary teams toward improving patient outcomes. To prepare our graduates for this expectation, it is incumbent upon our colleges and schools to develop methods to integrate our students as well. This has mainly occurred through our Professional Experience Programs. The challenge for the College of Pharmacy, as well as the other members of our academic medical center, is to work together to build additional avenues for interdisciplinary professional student training programs.

The number of colleges and schools of pharmacy in the United States has dramatically increased in the past decade, and a national shortage of pharmacists has created a “brain drain” from the academy. These and other factors raise concerns about the adequacy of pharmacy faculties in the near future. The challenge to academic pharmacy is to develop incentives to encourage our best and brightest students to consider careers as faculty members. We view our combined PharmD/PhD program as an important tool in this regard. The College will continue to develop mechanisms to enhance student interest in this educational pathway.

The American College of Clinical Pharmacy (ACCP) recently published a position paper⁵ proposing that residency training be required for entry into pharmacy practice by the year 2020. While this goal may not be universally embraced, it highlights the need for advancements in the number of high quality institutional and ambulatory pharmacy practice residency sites. Ohio State has been a leader in the development of such programs, and we must continue to emphasize residency program development in the future.

4. Discussion of Current Efforts Toward Programmatic Improvements

Efforts to improve the PharmD program have occurred at both the course level and at the program level. At the program-level, the faculty completed a revision of the outcomes for the PharmD program, and in February 2006, the faculty approved the revised outcomes. These outcomes are based on national accreditation standards and pharmacy educational guidance documents, and they describe the qualities that an entry-level practitioner should possess at the conclusion of the PharmD program. Faculty then linked the outcomes to the courses in the curriculum to form a map of where, how, and to what degree the outcomes are addressed in the PharmD program. This curricular map will be used as a tool to help faculty identify gaps and overlaps in the program and to generally guide areas for improvement to the professional curriculum. Similarly, an annual survey of faculty and students about the delivery and achievement of outcomes in the curriculum has been used to inform improvements to the program such as changes to the drug literature evaluation content and the communication content across the program. Faculty have also begun planning for the addition of ability-based assessment to the program. This type of assessment evaluates students by having them demonstrate what they can do with what they learned in the program.

⁵ See *Pharmacotherapy* 2006; 26(5):587-593.

At the course level, the four-course management sequence was revised to address content gaps and overlaps as well as to address student concerns of the relevancy of the course content to the contemporary practice of pharmacy. The pharmaceuticals course sequence was also revised so that the new technology of pharmacogenomics could be added to the program. In order to allow students to engage at a more advanced level with self-care, over-the-counter products, and communications content, Pharmacy Practice III was moved to from year one to year three of the curriculum. And finally, a faculty position was added to address issues of consistency, integration, pedagogically sound sequencing, and improve student learning outcomes for the six course therapeutics sequence.

The College faculty and administration continue to be committed to programmatic improvements both through faculty service on committees that support the work of such improvements and through the fiscal support of the addition of an Assistant Dean for Assessment and Accreditation.

5. Recommendations for the Future

The College's current strategic plan was approved by the faculty in June 2006. It includes strategic priorities for our educational programs, research and scholarship, pharmacy practice and patient care, and outreach and engagement. Strategic priorities for our professional programs include the following:

- Implement curricular mapping and create linkages between the defined outcomes of the curriculum and course content.
- Develop the capacity and incentives to review and to redesign the curriculum via the assessment process.
- Develop courses that support curricular outcomes, are more integrated (e.g., evaluate disease-based curriculum), eliminate unnecessary redundancy, enhance student communication skills, and ensure that students can apply what they are learning.
- Develop additional elective courses for the PharmD program.
- Examine adding a capstone course prior to the P-4 year.
- Continue progress to implement ability-based assessments.
- Increase learning opportunities based on interdisciplinary teams and enhance interprofessional education
- Evaluate re-establishing teaching teams by content or programmatic emphasis and identify key resource people.
- Enhance experiential program assessment and improve quality assurance for experiential rotations.
- Identify the areas of experiential training where growth is needed (number, expertise), consider targeted investments in high quality Professional Experience Program sites, and examine need for increased clinical faculty positions for experiential teaching.
- Continue progress in implementing the combined degree programs (currently PharmD/PhD, PharmD/MBA, PharmD/MPH) to prepare future pharmacy faculty and pharmacy leaders.
- Provide rewards for excellence in teaching.
- Increase teaching assistant resources, including graduate students and residents.
- Create additional distance-learning courses.

- Increase development efforts for PharmD student scholarships.
- Make needed improvements to the College infrastructure and classrooms, and place a priority on development efforts aimed at raising funds for enhancing the College teaching infrastructure.

Special Emphasis Self-Study in Graduate Education in the College of Pharmacy

1. Description of the College's Graduate Programs

The College offers both M.S. and Ph.D. programs. Students are educated within four major focus areas in pharmaceutical research: Medicinal Chemistry and Pharmacognosy, which involves design and discovery of new drugs, synthetic medicinal chemistry, natural products chemistry and molecular modeling; Pharmaceutics, which focuses on the study of drug effects on cells and tissues, analysis of changes in drug effects over time, and development of drug delivery and targeting systems; Pharmacology, which examines the biochemical and physiological mechanisms by which drugs exert their biological effects and potential toxic side effects; and Pharmacy Practice and Administration, which involves the determination of optimal therapies and dosage regimens of drugs, examination of economic issues related to use of drugs, study of patients' behaviors relative to use of medicines, and the study of medication use safety. In addition, the Master of Science in Health-System Pharmacy Administration, a professional program, focuses on management of pharmaceutical care in organized health care settings. The program accepts pharmacists registered to practice in the United States. It emphasizes provision of professional services to patients and members of the health care team, along with managerial activities and financial responsibilities in health system pharmacies.

Recent years have been very productive for our research and scholarship, achieving unparalleled levels for the College. These accomplishments reflect the high-quality research being performed on a daily basis by faculty, students, postdoctoral scholars, and research staff. The number of book chapters and peer-reviewed journal articles totaled 20 and 160 for calendar year 2005. The College's sponsored research portfolio includes grants and contracts from NIH, NSF, US Army Breast Cancer and Prostate Cancer Research Programs, other federal agencies, the State of Ohio, the pharmaceutical industry, and private foundations and donors. The total for research funding for federal FY06 (10/05 – 9/06) was approximately \$5.7 million.

2. Continuous Quality Improvement of College Graduate Programs Following the Reports of the Freeman and Beck Committee

Enrolled Ph.D. students were surveyed in 2006 by the Office of Institutional Research and Planning at The Ohio State University, using a survey instrument that listed markers of quality; students were asked to rate each marker as Excellent, Very Good, Good, Fair or Poor. Twenty-three of about 80 Ph.D. students completed this survey. An exit survey instrument is also offered to all Ph.D. graduates of our program; the completed survey is closely held and graduates are assured that their survey forms will not be shared outside the graduate study chair's office. This survey has been conducted for many years.

Forms from Winter 2000 through Summer 2006 were completed by 64 of 100 graduates. Students and graduates were generally positive for the following items: relationships between students and faculty, coursework and opportunities to take coursework outside the department, and opportunities to engage in interdisciplinary work. The surveys showed the following areas of concern: integration of recent developments in field, quality of graduate-level teaching, assistance in finding employment, opportunity to interact across disciplines, tensions among faculty that affect students, and overall program quality. These survey results are being studied by the College's Graduate and Research Committee, with the aim of developing action plans to address the concerns.

Annual review and evaluation of graduate students has been a long standing policy of the College that has not been regularly carried out. This issue was reviewed by the Graduate and Research Committee last academic year and the committee endorsed the policy and developed a form that structures the review and thereby assists faculty with the annual performance review. Distribution and collection of the review forms is now carried out by the Office of the Associate Dean for Graduate Studies and Research, who is charged with ensuring that the reviews are conducted. In addition, the teaching assignment performance of those students supported with a graduate teaching associate appointment are to be evaluated at the end of each quarter by the faculty member to whom the student is assigned in support of teaching. As with the annual performance review, these evaluations are now overseen by the Office of the Associate Dean.

To improve opportunities for collaborative research, the College of Pharmacy Research Day 2006 was inaugurated on May 11 and successfully showcased the research activities of the College. The all-day event included 70 poster displays of current student and faculty research and an afternoon research symposium. This year, the symposium was held in honor of emeritus faculty member Dr. Popat Patil. The symposium featured lectures from alumni who studied under Dr. Patil, and a reception following the symposium allowed for informal interactions.

Another new activity in support of research was the inauguration of the College's Distinguished Lecture Series. The College has for a number of years regularly hosted distinguished lecturers; e.g., H.O. Schild, U.S. von Euler, Sir James Black, Robert J Furchgott, J.P. Changeux. (von Euler, Black, and Furchgott were Nobel Prize recipients.) Starting in 2005, the Distinguished Lecture Series was initiated to more systematically expose faculty, graduate and professional students to outstanding pharmaceutical scientists. Selection of lecturers involved nominations by the division faculty, and their approval by the Graduate and Research Committee and the Executive Committee. Lecturers are invited and hosted by the divisions, with costs shared between division and college budgets. The Distinguished Lecturers and lecture titles for 2005-06 were:

- Neal Castagnoli, Ph.D., Peters Professor of Chemistry, Virginia Tech, for the Pharmaceutics Division. "Mechanistic Studies on the Enzyme-Catalyzed Oxidations of Amines".
- J. Steven Leeder, Professor, U. Missouri Kansas City, for the Pharmacy Practice and Administration Division. "Prenatal Pharmacogenetics and the Promise of Developmental Pharmacogenomics."
- Daria Hazuda, Ph.D., Vice President, Virus and Cell Biology Research, Merck Research Laboratories, for the Pharmaceutics Division "HIV-1 Integrase Inhibitors: Past, Present and Future?" Dr. Hazuda is particularly credited for discovery of the first authentic HIV integrase inhibitors now under development for HIV therapy.

- Mansukh C. Wani, Ph.D., Principal Scientist, Research Triangle Institute, for the Medicinal Chemistry and Pharmacognosy Division. “Plant-Derived Anticancer Agents, Taxol and Camptothecin: From Bench to Bedside”. Dr. Wani was co-discoverer of two widely used anticancer drugs, camptothecin and taxol.

The Distinguished Lecture Series was well attended and considered to be an important contribution to the research environment of the College. The series is being continued for the 2006-07 year and it is planned to remain as a permanent program of the College.

3. Discussion of Broad Issues of Program Quality

Application and Admission

The number of completed applications over the 2002-2006 period has averaged 191 per year (range: 149-243). Completed applications include transcripts of college-level course work, GRE scores, TOEFL scores when English is the second language, applicants statement of purpose, and three letters of reference. Admission is competitive and faculty select applicants to be admitted. As those admitted have excellent credentials for graduate study and apply to several programs, several of the

Autumn:	2002	2003	2004	2005	2006	Average
Applications	202	243	149	152	211	191
Admitted	30	37	37	45	36	37
Enrolled	20	29	22	28	22	24.2
domestic	10	17	9	12	13	12.2
international	10	12	13	16	9	12
GRE - verbal	472	553	525	473	479	500
- quant.	690	716	695	690	692	697
- analyt.	630	711	725 (11)	618 (5)	710 (4)	671
- analyt.			4.0 (11)	3.93 (23)	4.14 (18)	4.0

admitted students accept other offers and decline to enter our program. Of those enrolled, about half are domestic and half are from other countries. GRE scores of admitted students have been good; verbal scores tend to be low due to the international applicants.

Enrollment and Support

Enrollment in the college's graduate programs has been stable and averages about 100 students.

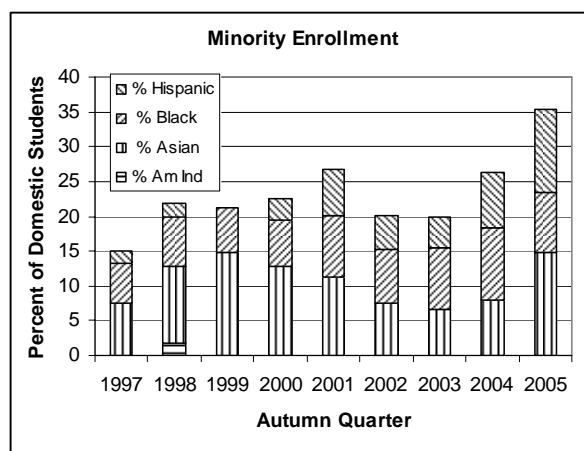
Autumn:	2002	2003	2004	2005	2006	Average
Enrollment	94	105	103	100	97	99.8
Domestic	42	46	39	34	41	40.4
International	52	59	64	66	56	59.4
GTA	28	33	36	40	34	34.2
GRA	52	55	52	44	46	49.8
training grant	3	2	2	1	1	1.8
fellowship	6	7	9	8	5	7.8

Nearly all students receive support in the form of a GTA or GRA; these are half-time appointments that currently provide about \$19,000 per year; a health-care benefit is included and tuition and fees are waived. Typically, students are supported by a GTA appointment for the initial year or two and then support comes as a GRA supported by sponsored research projects. GTA responsibilities involve assistance of faculty with courses offered to students enrolled in either the BS in Pharmaceutical Science Program or the Pharm.D. professional program. These responsibilities are primarily assistance with laboratory courses and to a lesser extent assistance with grading exams, lab reports, and student assignments. GTA's are generally not responsible for teaching in lecture-based classes.

Newly admitted students are initially assigned a temporary advisor, who provides a desk with other students supervised by the advisor and who advises the student until a permanent advisor is selected. Through informal interactions with faculty and students, and participation at weekly graduate seminar, the beginning student is acquainted with research opportunities and seeks a permanent advisor during the first year in the program. During the first two years, students are engaged primarily in course work and in the duties associated with their GA appointment. The candidacy exam is usually taken during the third year of study and when passed the emphasis shifts to dissertation research. The average time to complete the PhD degree is 53 months.

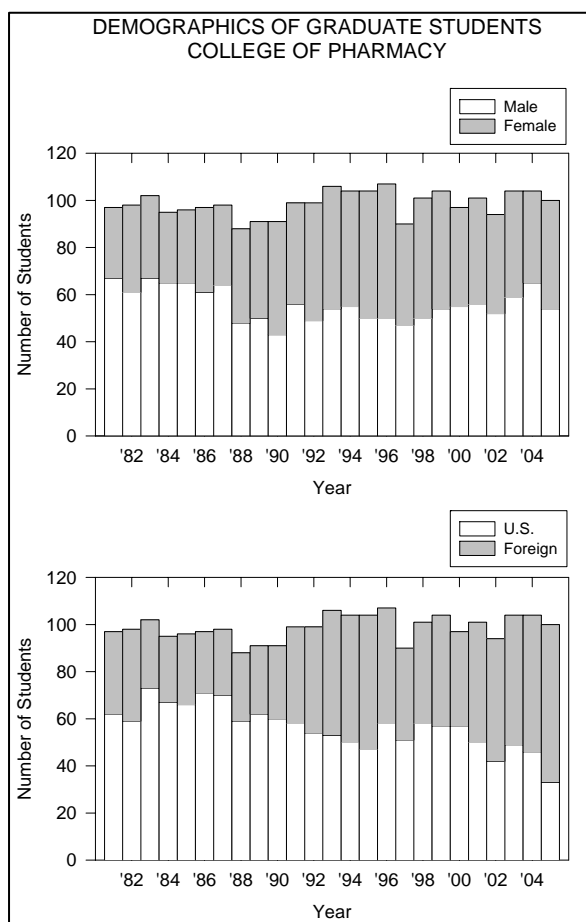
Diversity of Student Body

The balance between men and women has been around 50:50. With regard to minority enrollment, international students are customarily not considered even though most of them would otherwise be considered members of minority groups. The percent of domestic students who are members of a minority group are shown in the chart on the right. The percentage has increased over recent years and currently about one-third of domestic students are members of a minority group, with significant representation from Hispanic, African American, and Asian groups. Native Americans are generally absent from the student body. When international students are considered, the graduate student body is highly diverse.



Enrollment Trends.

There is an even balance between males and females. The number of international students has grown to become about 60% of the enrollment. While the quality of the international students is excellent, there is a concern about the balance having moved too far toward a high fraction of international students. The longer term trends indicate that over twenty years the proportion of domestic students has declined appreciably. During this period, enrollment in the MS in Health-System Pharmacy Administration program has increased to 14; this program accepts primarily domestic students and it is directed more toward advanced pharmacy practice rather than research training. If the contribution of this program to the domestic student enrollment is removed, then the proportion of international students in the research-based, primarily Ph.D. program is considerably elevated. The Graduate and Research Committee is discussing approaches to recruitment of domestic students.



Employment

Graduates of the M.S. in Health-System Pharmacy Administration program all find employment in their field of training, primarily in administration of hospital pharmacy services in large hospitals and medical centers.

Ph.D. graduates are in high demand for positions in pharmaceutical companies and academia, and some enter postdoctoral positions to strengthen their research expertise:

	2000	2001	2002	2003	2004	Average
Industry	6	9	4	6	5	6.0
Academic	5	3	0	0	0	1.6
Postdoctoral	4	4	5	2	7	4.4
Other	1	1	1	0	1	0.8
Total	16	17	10	8	13	12.8

Quality of Faculty

The graduate faculty numbers 47 (autumn 2006) and most of the faculty are successful and productive in their research, research funding and participation in the graduate program. Excellent disciplinary research and exciting interdisciplinary research in drug discovery, drug action, drug delivery, and drug development are being led by our faculty. Our faculty are engaged in exciting innovative practice models of medication therapy management. Also, faculty and staff serve the University and profession at both the regional and national levels and are involved in stimulating outreach and engagement

activities. The high quality of our faculty is reflected in the fact that total of 20 out of the current 30 senior faculty in the College of Pharmacy have been honored by their peers and elected as Fellows of scientific organizations (American Association for the Advancement of Science, American Association of Pharmaceutical Scientists) or professional pharmacy organizations (American Pharmaceutical Association, American Society of Health Systems Pharmacy, American College of Clinical Pharmacy).

This past academic year was very productive for our research and scholarship, achieving record levels for the College. For federal fiscal year 2006 (October 1 2005 – Sept. 30 2006) 22 of the faculty served as principal investigator of one or more sponsored research projects. Thirty-five projects were active during the year, with a total value of \$5.8M per year. Faculty authored or co-authored 160 peer-reviewed publications and 20 book chapters. Graduate students were heavily involved in these research activities. These accomplishments are the reflection of the high-quality research being performed on a daily basis by faculty, students, postdoctoral scholars, and research staff. The College's research portfolio includes research grants and contracts from NIH, NSF, US Army Breast Cancer and Prostate Cancer Research Programs, other federal agencies, the State of Ohio, the pharmaceutical industry, and private foundations and donors.

Interdisciplinary Activities

Graduate faculty of the College participate in four Interdisciplinary Graduate Programs: Molecular, Cellular, and Developmental Biology; Biophysics; Ohio State Biochemistry Program; Neuroscience Program. The number of students advised by pharmacy faculty in these programs averages 6-8; these students are not included in the enrollment data shown in preceding sections.

Facilities

Research laboratory and support facilities are located in L.M. Parks Hall, a five-story building completed in 1968; a wing on the north end was added in 1978 and a two-story addition was completed in 1999. The College of Pharmacy occupies all of Parks Hall and shares, with the College of Biological Sciences, the adjacent Riffe Building, completed in 1994. The College's net assignable research laboratory space is about 12,000 ft² in the Riffe Building (floors 4-6) and 34,000 ft² in Parks Hall. All the Parks Hall research laboratories are in the original building and the 1978 addition. While some laboratories on the third and fourth floors (5,882 ft²) have been renovated within the past 15 years, the remainder of the lab space (~28,000 ft²) requires considerable renovation to erase 25-35 years of wear and tear, and to comply with current standards of health, safety, security, and access.

4. Discussion of Other Issues Relevant to Graduate Education in the College

Student Support

Cost of tuition and stipends is growing and support of students on research grants and contracts is a concern of college faculty. The Freeman Committee recommended that doctoral student tuition be "reduced or eliminated" after an appropriate point in the timeline of doctoral studies. The College of Pharmacy strongly supports this recommendation.

5. Discussion of Current Efforts Toward Programmatic Improvements

Recruitment of Domestic Students

Emphasis has been placed in recent years on the recruitment of domestic graduate students. To interest more students in the pharmaceutical sciences, the college has supported for several years a summer research experience for six students, selected by a faculty committee. Applications are sought from both OSU and non-OSU Bachelors program students. The ten-week research experience is supported by a stipend of \$3,500 and students carry out research in a pharmacy faculty's research lab. Applications for this program are in the range of 25-35, and some of those not chosen for the college-supported stipend are picked up by faculty and supported on research grants and contracts. Another initiative has been to vigorously court domestic applicants, through expenses-paid visits to the college for day-long interactions with faculty and graduate students.

Recruitment of Minority Students

The College of Pharmacy has been a leader in the development of affiliation agreements designed to diversify our graduate and post-doctoral programs. In 1989, we were the first in the country to forge such an affiliation with a minority institution (Xavier University of Louisiana). More recently, we have established relationships with the institutions of the Atlanta University Center (Clark Atlanta, Morehouse and Spelman) and the University of Puerto Rico. We have also established close connections to the National Pharmaceutical Association and the Student National Pharmaceutical Association at the local and national levels. These relationships with minority institutions and professional associations have engendered greater visibility among minority students, practitioners and academicians. Our recent focus has been a development campaign to fund diversity programs in recognition of the legacy of Dr. Roy Darlington, the first African American to receive a PhD in the pharmaceutical sciences (OSU '47). We have already raised a sizable endowment toward this goal, but we envision much more, including making the Darlington Campaign a priority in our upcoming capital campaign. Ultimately, the Darlington Program could support minority faculty development as well as student research, scholarships, and fellowships.

In addition to the undergraduate summer research program described in the preceding section, a separate summer research opportunity for under-represented minority students has been in operation for the past three summers. This program offers the \$3,500 stipend and in addition room and board in university housing, and travel expenses. Participation by Spelman and Morehouse students was two in 2004, three in 2005, and three in 2006. One Spelman graduate entered our Ph.D. Program in autumn 2006.

Research Focus Groups

The top priority in our 2006 College of Pharmacy Strategic Plan is to establish faculty research focus groups to identify priorities for strategic investments in focused areas of pharmaceutical sciences, diseases or functional pathways. The focus groups will increase awareness of faculty research activities, encourage collaborative research opportunities, and expand extramural research funding.

College Interdisciplinary Research Incentive Program

To further facilitate faculty collaborations, a College Interdisciplinary Research Incentive program will be initiated focusing on the College TIE proposals on "Innovations in

Pharmaceutical Discovery” and “Improving Medication-Related Health Outcomes in the 21st Century.” This program will be a “seed grant” investment of \$50,000 (one in each TIE area) and involve submission of a seed grant proposal. The announcement describing the seed grant application process will be sent to the faculty in January 2007, with grants due in mid-March 2007. Selection of the recipients will occur in Spring Quarter 2007.

Faculty Development Program

This program will be initiated to assist current faculty in enhancing research training experiences in the TIE proposal areas, such as pharmacokinetics, metabolism, molecular targets, computational modeling, systems pharmacology, and/or health outcomes research. This program will include one-quarter special research assignments (SRA), faculty professional leaves (FPL), and support for travel requests over the next two academic years. The announcement describing the development program will be sent to the faculty in Winter Quarter 2007. The approval processes will follow our standard procedures at the Division and College.

6. Recommendations for the Future

The following initiatives are part of the College’s Strategic Plan, which was approved by the college faculty in the spring of 2006. The strategic plan was developed by three strategic planning groups that were formed around the themes of Vision and Mission, Education and Outreach, and Research and Scholarship (drug discovery, development and therapeutics). The Ohio State University Academic Plan and Leadership Agenda provided an overall university vision that informed our evaluation and planning process. During the 2004-2005 academic year, external reviewers for each of our four academic Divisions visited the College and provided evaluations of teaching and research activities. Two faculty retreats, one near the beginning in December 2003 and the second in December 2005, communicated plans and provided valuable input in the evaluation and process. The graduate education and research components of the strategic plan are as follows:

Graduate Education Programs

Vision:

We envision an outstanding cadre of graduate research students who are fully engaged in our educational and research enterprises.

Strategic Priorities:

- Enhance graduate education and training in pharmacy and pharmaceutical sciences, guided by graduate program metrics and comparisons with peer institutions.
- Seek support for the establishment of fellowships for combined PharmD/PhD students and for expansion of the PharmD/PhD program.
- Develop training grants in the pharmaceutical sciences/drug discovery, development and therapeutics.
- Promote interdisciplinary discussions (e.g., seminar series) and interactions for knowledge exchange relating to drug development.

- Strengthen graduate student understanding of drug development, focusing on interdisciplinary team drug development.
- Conduct College-wide seminars with interdisciplinary content for faculty and students.
- Consider adding a first-year graduate student cross-divisional survey course.
- Increase development efforts for graduate student fellowships.

Research

Vision:

Our vision encompasses a robust pharmaceutical science and clinical research enterprise with emphases in interdisciplinary scholarship. Our faculty will be viewed as leaders in the discovery, development, delivery and use of drugs, which will translate into innovations in pharmaceutical care.

Strategic Priorities:

- Maintain a diversity of independent investigators while focusing faculty hiring in strategic key areas.
- Develop initiatives to combine efforts that enhance research and encourage collaborative team research within OSU and beyond, e.g., Targeted Investments in Excellence proposals (Appendix).
- Establish faculty focus and/or special interest groups to identify priorities for strategic investments in focused areas of pharmaceutical sciences, diseases or functional pathways.
- Conduct College-wide seminars with interdisciplinary content for faculty and students and promote interdisciplinary discussions and interactions for knowledge exchange relating to drug discovery, development and therapeutics.
- Emphasize translational research including research at the bench, at the bedside, and in practice settings.
- Increase research opportunities and extramural research funding (including program project grants) based on interdisciplinary teams.
- Assess our strengths and work to fill gaps relative to federal funding opportunities, such as the NIH Roadmap Initiatives.
- Establish a core instrumentation center with state-of-the-art instrumentation to encourage collegial interactions.
- Seek opportunities and funding to increase and improve laboratory space.
- Support the development of intellectual property that facilitates licensing of technology and products.
- Enhance the faculty mentoring program and encourage faculty professional leave opportunities.
- Increase development efforts for endowed professorships and chairs.
- Appoint a committee to nominate faculty for external awards.