UTD

THE UNIVERSITY OF TEXAS AT DALLAS

DEPARTMENT OF MOLECULAR AND CELL BIOLOGY
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Donald M. Gray
Professor and Head

October 20, 2006

Dr. Robert S. Nelsen, Associate Provost
The University of Texas at Dallas

Dear Dr. Nelsen,

The Self-Study Report for the Department of Molecular and Cell Biology is finally ready. I apologize to you and the Review Committee for not having submitted the document sooner.

Early this past summer I asked an *ad hoc* committee of Drs. Jeff DeJong and Juan González, together with Administrative Assistant Eloise Square, to help with preparing the document. Data were obtained from many units of the University, including the Office of Sponsored Projects, the Health Professions Advising Center, the Office of Strategic Planning and Analysis, the Office of Graduate Studies, the Office of the Dean of Natural Sciences and Mathematics, and our own departmental records. I cannot thank the *ad hoc* committee and our departmental staff enough for their hard work in organizing data and preparing the body and appendices of the document.

As sections were drafted, they were sent to the tenured/tenure track faculty for input. Numerous faculty made contributions, and points 2-8 of the final section on Action Recommendations are substantially those drafted by a collaborative group of faculty. In addition, Drs. Betty Pace, Steven Goodman, Lee Bulla, and Rockford Draper provided material from which excerpts are included in the section on Research and Centers. A penultimate draft of the report was sent to all the faculty, including Senior Lecturers, for their final comments.

I thank all the faculty for their insightful comments on the content and presentation throughout the process. I have tried to merge the input I received to present the best amalgam I can generate as an objective basis for the Review Committee's investigations. However, the final responsibility for the submitted document is mine.

The upcoming review comes at a critical period in our department's history, and I believe that all the faculty look forward to the Review Committee's independent assessment of the department's activities, needs, and promise.

Most sincerely,

Donald Gray, Professor and Head
Department of Molecular and Cell Biology

SELF-STUDY REPORT

DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

THE UNIVERSITY OF TEXAS AT DALLAS

October, 2006

CONTENTS

I. Mission and General Goals

The mission of The University of Texas at Dallas (UTD) is to provide Texas and the nation with the benefits of educational and research programs of the highest quality. These programs address the multi-dimensional needs of a dynamic, modern society driven by the development, diffusion, understanding and management of advanced technology.

In conformity with UTD's mission, the mission of the Department of Molecular and Cell Biology (MCB) at The University of Texas at Dallas is to maintain and enhance a nationally competitive research program, to train students to become outstanding scientists, and to provide an exceptional education that prepares students for careers and continued education in the life sciences, health, and medicine.

The current status of the MCB department should thus be assessed in terms of the goals of the university, recommendations of a 2004 report by the Washington Advisory Group (WAG), and the 2005 strategic plan of the School of Natural Sciences and Mathematics.

Goals of UTD

To be a nationally recognized top-tier university sculpted within a model of focused excellence. The university emphasizes education and research in engineering, science, technology and management while maintaining programs of focused excellence in other academic areas. Within the context of this mission, the goals of the university are as follows:

- To provide able, ambitious students with a high-quality, cost-effective education that combines the nurturing environment of a liberal arts college with the intellectual rigor and depth of a major research university.
- To discover new knowledge and to create new art that enriches civilization at large and contributes significantly to economic and social programs.
- To enhance the productivity of business and government with strategically designed, responsively executed programs of research, service and education.

The university intends to achieve these objectives by investing in students and faculty, building upon its programs, policies and operations and enhancing institutional character and excellence in education. The major points of UTD's strategic plan to accomplish these goals are as follows:

- Continue to strengthen the identity of the university as a leader in higher education in terms of excellent faculty and superior students.
- Enhance the quality of its students' learning experiences and its employees' work environment.
- Emphasize education and research in science and technology and in leadership and management, while maintaining concurrent programs of focused excellence in other fundamental fields of art and knowledge.
- Expand and intensify partnerships relations with business, governmental and educational neighbors.
- Enhance programmatic quality and institutional balance while adhering to rigorous

quality standards.

- Actively pursue external support of and funding for the ambitious academic and service programs integral to its mission.

WAG Report

The following paragraphs are taken from the May, 2004, report prepared for the University of Texas System by the Washington Advisory Group (WAG) a nationally prominent consultancy.[1]

> "The main obstacle that UTD faces in achieving its goals relates to scale – UTD is simply too small in terms of the total number of faculty in each disciplinary or sub-disciplinary area. This problem of scale handicaps it in two ways: it reduces the national visibility of UTD as an institution (as opposed to the visibility of many individual faculty members) and it often prevents its faculty from participating in the large programmatic grants that are the mechanism through which a significant part of the funds available from federal granting agencies are distributed."

With regard to the MCB Department the WAG report states:

> "This Department has a number of well trained, research productive faculty members, but fewer than half have external grant support.[2] Faculty members carry out research in a variety of areas within "modern biology," i.e., genomics, proteomics, bioinformatics, structural biology, and animal models of disease, without an overall focus on any particular area. Thus, at present, there is no critical mass of excellence in a sub-discipline, and the Department is too small and spread too thin. The Department must hire 8 to 10 new research active faculty members in order to develop the necessary critical mass.
>
> A healthy Department of Molecular and Cellular Biology is vital, even if the University's main focus is on engineering, computer sciences, and physical sciences. This is true not only because of the increasing intersections of these disciplines at the cutting edge of molecular biology, neuroscience, computational biology, bioengineering, etc., but also because of the availability of funding in those fields and the increasing emphasis on interdisciplinary research."

The report concludes with recommendations:

> "As described above, we found NSM's departments and programs to be, for the most part, too small for the University's aspirations, but with pockets of strength on which it can build. Our specific recommendations for the School are as follows:
>
> 1. Physics, chemistry, biology and related departments and centers are cores of strength in almost every successful research university. UTD has a small foundation of productive

[1] The full relevant text is appended as Appendix A - part 1. The full report may be found at www.utsystem.edu/news/WAG/homepage.htm, and the UTD response may be found at www.utdallas.edu/utdgeneral/wag/response.htm.

[2] Incorrect: More than one-half of the MCB faculty had and have outside grant funding. See Section VIII.

researchers in these fields. However, the school must double the size of its tenure and tenure track faculty over the next decade to achieve critical mass, satisfy teaching responsibilities, and create a real possibility of increasing its externally funded research to the $50 million level to which the school aspires. Adequate space will have to be made available to provide for the new hires and for growth in the current faculty's research programs.

2. Research active faculty members should have teaching loads of no more than 2+1, and in some cases less, depending on the magnitude of their research programs.

3. The Department of Molecular and Cellular Biology, a forefront and well funded field, is particularly small relative to what is required for critical mass and for its potential contribution to the sponsored research at UTD. A permanent chair must be recruited as soon as possible,[3] and the department should add at least 8 to 10 new research active faculty members at a rate of approximately two per year."

Goals of NS&M

With regard to the Department of Molecular and Cell Biology, the June 15, 2005, the strategic plan of the School of Natural Sciences and Mathematics includes the following:[4]

"**Faculty size:** 14 public universities without medical schools ranking in the top 51-100 of 100 research universities have an average of 59 faculty in life sciences departments. The current MCB faculty is unacceptably small compared to these, with only 16 faculty members, and is woefully small given the growing number of majors which have more than tripled over the last ten years. A *minimum* faculty size of 50 research-active individuals in the life sciences is required. Considering attrition and retirements, an average rate of 3 to 4 hires per year will yield the required faculty size within a decade.

Rationale: Current faculty in the MCB department attract an average of $220,000 per year per faculty member, which is comparable to faculty in departments of the top 51-100 research universities. Fifty research-active faculty are projected to attract over $10 million/year at the present rate. This number of faculty also affords the diversity and breadth to compete for larger program and center-type grants.

Space: There should be about 1500 - 1800 assignable sq ft per faculty lab, plus space for offices, equipment and common facilities. The anticipated 50 research groups could be accommodated in a Life Science building of at least 150,000 gsf that includes an appropriate animal care facility."

[3] At the time of the WAG visit, the department was administered by the Dean and a "troika" committee of faculty.
[4] The full relevant text is appended as Appendix A - part 2.

General Goals of MCB

Synonymous with the above goals and recommendations, the major goals of the MCB department are to increase the quality and scale of its educational and research programs. The MCB faculty believes that a strong MCB department is at the center of the university's goals and efforts to become a Tier One research institution. Due to the bio-centric nature of modem scientific research and education, and the availability of federal funding related to applying genomic and proteomic information to solving problems of health and disease, MCB must become a centerpiece department at the University of Texas at Dallas. This will require a strong departmental leader recruited externally, a doubling of the current size of the department, decreased teaching loads for well-funded faculty, appropriate space that enhances interactions between departmental research teams, institutional support of key core facilities (including trained personnel to oversee the equipment and service contracts), a focus on building interdisciplinary teams with faculty from other UTD departments and schools, and formation of alliances with faculty at other outstanding universities and medical schools throughout the United States and worldwide. The following sections of this Self-Study outline the present circumstances of the department and the aspirations of the faculty, for consideration by the Program Review Committee.

II. History of Molecular and Cell Biology at UT Dallas

The Department of Molecular and Cell Biology (MCB; also designated as the Department of Biology) began as the Division of Genetics of the Southwest Center for Advanced Studies in 1964-65. The staff of the Division of Genetics consisted of 16 to 20 faculty, together with laboratory and technical assistants, postdoctoral fellows, visiting professors, and graduate students from several universities working on dissertations. Their principal mission was research in the new field of molecular biology, conducted in the context of graduate education. Some faculty members held adjunct appointments and taught courses at neighboring academic institutions. In addition to Center funds, by 1968 the Division of Genetics had the support of over $1 million annually in external grants. In September 1969, with 17 faculty, the Division of Genetics became the Division of Biology of a new campus of the University of Texas System. As part of a public university, the Division of Biology became ineligible for the substantial federal grant that had supported the program, and external support dropped to $625,000.

A continuing faculty commitment to basic research in molecular and cell biology has provided the expertise for the department's up-to-date graduate training, as well as critical financing for its costs. Annual extramural support increased to $700,000-800,000 in the early 1980s, to over $1 million at the end of the decade, and is now about $4 million per annum. Grant funding is reviewed in section VIII.

Degree Programs

Initially, UT Dallas was a graduate-level institution, and in 1970 UTD admitted its first masters and doctoral students to a molecular biology program. The graduate program was the first in the state in the general area of molecular biology, an area destined to undergo a revolution in the 1970s with the development of techniques for genetic recombination and cloning. Between 1970 and 1976 the graduate program grew to 36 students and in 1975 the faculty planned and implemented a junior/senior (upper level) undergraduate program. The emphasis of both the graduate and undergraduate programs on molecular biology was distinctive at the time and remains the departmental focus. By 1979, the graduate student enrollment increased to more than 50, and undergraduate majors numbered about 80. Graduate student enrollment in the MS and PhD degree programs in Molecular and Cell Biology was 50-60 students in the early 1990's and has remained relatively steady. Begun in 2003-2004, the MS in Biotechnology program was initially administered by the School of Natural Sciences and Mathematics and was transferred to MCB in the spring of 2006. This program now has a graduate student enrollment of over 30 students, so there are a total of over 90 graduate students in the department to begin the fall 2006 semester.

The biology undergraduate degree programs have attracted a rapidly growing number of majors as the consequence of the expansion of UT Dallas to become a 4-year undergraduate university in 1990. There are now over 900 biology majors. The undergraduate and graduate programs are reviewed in sections IV and V of this report.

The department currently administers eight degree programs under the broad category of

Biological and Biomedical Sciences of the Texas Higher Education Coordinating Board (Table II-1). In addition, the university has preliminary authority to offer additional baccalaureate, MS and PhD degrees in this broad category.

Table II-1. Eight degree programs administered by the Department of Molecular and Cell Biology (program inventory of the Texas Higher Education Coordinating Board)

Program Name	Degree
Biology	BA
Biology	BS
Molecular Biology	BS
Biology	MS
Biology-Cell & Molecular Biology	MS
Biotechnology	MS*
Biology	PhD
Biology-Cell & Molecular Biology	PhD

* Administered with the input of a 10-member interdisciplinary advisory Committee on Biotechnology

The MCB departmental faculty are involved in two additional degree programs, the BS degree in Biochemistry (administered by the Department of Chemistry), and the MS degree in Bioinformatics and Computational Biology (administered by the Department of Mathematical Sciences).

Department[1] Administration

During the 1970s, six faculty were lost through death and resignation with only one replacement, due to budgetary restrictions. Grant income slipped to $400,000-500,000. The difficulties of diminished means for meeting larger responsibilities left no faculty member willing to head the department, and from 1977 to 1979 its administration fell to the Dean of Natural Sciences and Mathematics.

Resumption of the department's leadership by Dr. Royston Clowes in 1979, and the ability to fill further faculty vacancies, started another stage of department development. Four new faculty members arriving in 1980-83 brought needed expertise in eukaryotic molecular and cell biology. The tenure-track faculty numbered 13 in 1983. Since then, there have been two deaths among the faculty, including the death in 1989 of the Program Head, Dr. Clowes, who was an internationally known expert on plasmid structure and replication. In addition, the Program lost four Full Professors by retirement, including two in 1989 and one in 1991. These six faculty were replaced by five Assistant Professors and the tenure-track faculty numbered 12 in 1994.[2]

The goal of recruiting an outside Program Head has been long-standing, and a search for an

[1] There were formally no departments until the mid 1990's, although within the School of Natural Sciences and Mathematics the administration of programs was essentially like that of departments.

[2] The UTD President, Dr. Franklyn Jenifer, was also a member of the faculty from 1994 until his retirement in 2005.

outside Program Head in 1988-1989 led to offers to two candidates. The offers were not considered attractive enough by the candidates and they both declined. In view of Dr. Clowes' serious illness in 1989, the faculty agreed to choose an internal interim Program Head in the expectation that another search for an outside candidate would succeed in the near future. Dr. Donald Gray served as interim Program Head for six years 1989-1995, except for a 6-month development leave in 1993 during which Dr. Dennis Miller was Acting Program Head.

The department was last reviewed by an outside committee in March 1994. One recommendation offered by both the faculty and the review panel was to recruit an outside head. Finally in 1995, the department recruited Dr. Ronald Yasbin, who had experience as Chair of Biological Sciences at the University of Maryland/Baltimore, to be Head of MCB. In the same year, Dr. Jeff DeJong was added to the faculty. (Two Assistant Professors left in 1994, so the number of tenure-track faculty remained at 12.) The faculty united behind Dr. Yasbin, updating the curriculum and the research vision of the department. By 1999, Dr. Hans Bremer had retired, but the faculty number increased to 15 under Dr. Yasbin's leadership, with the additions of Drs. Juan González (1996), Lee Bulla and Santosh D'Mello (1998), and Matthew Junker (1999). In 1999, Dr. Yasbin was unexpectedly fired by the administration. This began a recent history of short-term administrations in the MCB department.

Dr. Lawrence Reitzer led the department as Interim Department Head from early 2000 until 2001, when Dr. Steven Goodman was recruited, from his post as Chairman of the Department of Cell Biology and Neuroscience, College of Medicine at the University of South Alabama, to be Head of MCB. Dr. Goodman started the UT Dallas Sickle Cell Disease Research Center (SCDRC), which maintains joint research efforts with the UT Southwestern Comprehensive Sickle Cell Program. He also recruited Dr. Betty Pace from the University of South Alabama. Dr. Pace came to MCB in January, 2003, and became Director of the SCDRC in 2004. With the additions of Drs. Goodman and Pace, the tenure-track research faculty numbered 17 in 2003.[3]

The administration of the department underwent another change in January, 2003, when Dr. Goodman resigned as Department Head to assume the Directorship of a newly formed Institute for Biomedical Sciences and Technology (IBMST) (see Section VII). MCB was administered for the remainder of the 2002-2003 AY by the Dean of NS&M, Dr. Richard Caldwell, with the participation of a "Troika" committee of the three previous Department Heads, Drs. Gray, Reitzer, and Yasbin. By the end of 2003, Dr. González had replaced Dr. Yasbin as a member of the oversight committee, because Dr. Yasbin left the department to become Dean of the College of Sciences at the University of Nevada, Las Vegas.

Dr. Caldwell ended his tenure as Dean of NS&M and was succeeded by an Interim Dean, Dr. John Ferraris, in September, 2003. In February, 2004, Dr. Gray was appointed as Department Head. Dr. Robert Marsh became Associate Department Head. During the past two years the MCB faculty have worked together to recruit two outstanding new faculty members, Drs. Tianbing Xia and Stephen Spiro. However, the tenure-track faculty has yet to grow above 16 members, due to the losses meanwhile of one Assistant Professor who was not promoted and the

[3] Four Senior Lecturers had also been appointed by this time and continue to play key teaching roles: Drs. Vincent Cirillo (since 1991), John Moltz (since 1995), Scott Rippel (since 1999), and Ilya Sapozhnikov (since 2001).

retirement of Dr. Marsh to part-time Senior Lecturer status in August, 2006. Dr. Dennis Miller now serves as Associate Department Head of MCB. With the anticipated closing of Founders building, eight or nine tenure-track MCB faculty are scheduled to move to the new Natural Sciences and Engineering Research Laboratory (NSERL) building while seven or eight will probably reside in Berkner Building. This splitting of the MCB department will add to the difficulty of administering it.

Relevant changes have recently occurred throughout the academic administrative structure at UTD. Dr. David Daniel, formerly Dean of Engineering at the University of Illinois at Urbana-Champaign took over as UTD President in June, 2005. Dr. Myron Salamon, Associate Dean of Engineering at the University of Illinois at Urbana-Champaign has been appointed to be the new Dean of NS&M starting in October, 2006.

III. Personnel, Program Administration and Budgets

Personnel

Faculty

As of fall 2006, there are 16 full-time tenure-track faculty, 8 tenured Professors (Drs. Lee Bulla, Santosh D'Mello, Rockford Draper, Juan González, Steven Goodman, Donald Gray, Betty Pace, and Lawrence Reitzer), seven tenured Associate Professors (Drs. Gail Breen, John Burr, Jeff DeJong, Ernest Hannig, Stephen Levene, Dennis Miller, and Stephen Spiro), and one tenure-track Assistant Professor (Dr. Tianbing Xia). Dr. Draper's appointment is 50% Molecular & Cell Biology/50% Chemistry and he divides his between the two departments. Dr. Claude S. Rupert is a Professor Emeritus but does not have an active laboratory or teaching responsibilities. Dr. Ying Liu of the Computer Science Department is an Adjunct Faculty member.

In addition, the faculty include three full-time Senior Lecturers (Drs. John Moltz, Scott Rippel, and Ilya Sapozhnikov) and two part-time Senior Lecturers (Drs. Vincent Cirillo and Robert Marsh).

Part-time lecturers are hired to teach in the undergraduate program as funds permit. Lecturers are restricted to no more than half-time teaching duties (two 3-SCH courses) each semester. Eight lecturers are on the payroll as of Fall, 2006: Drs. Irina Borovkov, Mehmet Candas, Gerald Friedman, Wen Ju Lin, Suma Robinson, Wen-Ho Yu, and Alice Zhou, and Ms. Aliece Watts.

Appendix B contains curriculum vitae for the tenure-track faculty and senior lecturers. Teaching is described in Section VI.

Research and support staff

There are currently 12 research associates and three technicians who are paid entirely from grants. Most departmental equipment and computer systems are maintained by two research engineers, one full-time and one half-time, who are aided by a half-time technical staff helper, supported by the department. The engineers also repair research equipment and maintain an array of web services, including remote printing, group email, on-line course syllabi, and the departmental web site. The department also supports a media kitchen for cleaning and sterilization of glassware that is staffed by a single full-time worker. Unfortunately, funding for the half-time engineer, a long-time employee of 35 years, was cut from the departmental budget in fall, 2006. He has been one of the most valuable and respected of the departmental staff.

Administrative and secretarial staff

One Administrative Assistant II and two secretaries, plus a work-study student, handle the extensive office work for the department and faculty. The work includes appointments of all employees and students, preparations of fiscal year and summer budgets, management of departmental budgets, departmental account reconcilations, time and effort certification, monthly and bi-monthly payroll processing, processing graduate student applications, registration of all graduate students, academic record keeping, class and departmental room scheduling, organizing

course evaluations, workload record keeping, scheduling of seminars and faculty meetings, arranging travel for faculty and visitors, organizing faculty searches, express mailing, ordering of office supplies, tracking orders on the small order purchasing system (SOS), preparing reimbursements and purchase vouchers, helping faculty with teaching and grant paperwork, and providing information to the Department Head.

The office staff in 1994 consisted of two administrative assistants, three secretaries, one half-time clerk and a work-study student. Although the registration of undergraduate students, originally handled by an administrative assistant in MCB, has since moved to be a responsibility of the School of Natural Sciences &Mathematics, the total MCB departmental workload has increased due to shifts in responsibilities from the school and university to the departmental level, an increase in graduate student enrollment, and credentialing and other procedures now required by the Southern Association of College and Schools (SACS) accrediting agency. Thus, the department is sorely in need of additional staff.

Program Administration

An organizational chart of the department is shown at the end of this section. The Department Head nominally holds a 50% time position and is paid 50% summer salary. The Department Head, Dr. Don Gray, is responsible for communication between the faculty of MCB and the Dean of NS&M, faculty recruitment, fostering professional relationships among faculty and students of the department, and in general for assuring that university policies and budgetary constraints are met. Faculty teaching duties are drafted by the Head, discussed with the faculty, and finally decided by the Head, with the goals of balancing the workload and meeting programmatic needs. At the beginning of each calendar year, the faculty submit to the Executive Vice President/Provost, via the Department Head and Dean of NS&M, an updated curriculum vitae and a review of their activities. Each spring, the Department Head conducts and forwards to the Dean performance reviews and merit raise recommendations for each faculty member, based on academic achievements, teaching excellence including graduate student supervision, and service to the university and department.

The Associate Head of the MCB department, Dr. Dennis Miller, holds a 67% time position and is paid 33% summer salary. He manages class scheduling, negotiates hiring of part-time lecturers, and works with the Head in managing faculty teaching duties. In addition, Dr. Miller chairs the three-member Undergraduate Education Committee (UGEC). The UGEC is one of two key committees that help administer the degree programs and educational aspects of the department, the other being the Graduate Education Committee (GEC). Drs. Lawrence Reitzer and Ernest Hannig are the Co-Chairs of the five-member GEC. They act as graduate advisors for students in the MS and PhD Programs in Molecular and Cell Biology. The GEC, among other duties, is responsible for recruiting, reviewing the qualifications of applicants to the graduate program, deciding which students will be admitted, and working with the Department Head to determine which new and continuing students will receive teaching assistantships.

The MS in Biotechnology Program has been administered by MCB since the spring 2006 semester. The MCB Department Head now chairs the MS in Biotechnology Program and, together with the Associate Head, is responsible for the admission and advising of students entering this program. Dr. Ernest Hannig, Co-Chair of the GEC, assists in reviewing files of

applicants to the MS in Biotechnology Program, with the goal of ensuring the quality of students who may take courses together with graduate students in the MS and PhD Programs in Molecular and Cell Biology.

The undergraduate and graduate programs are summarized in Sections IV and V.

All major academic and budgetary decisions are discussed at monthly faculty meetings open to all tenure-track faculty, senior lecturers, and part-time lecturers. Governance of the MCB department has historically been democratic and important issues are decided by voting. Recruitment of new faculty is decided by faculty vote and undertaken by faculty committees. Three graduate student representatives attend the non-confidential portion of the meetings and have a vote on relevant issues, including the hiring of tenure-track faculty members.

Budgets

The annual state budget is divided into two parts, the instructional budget and a separate budget for classified salaries and departmental operations.

Instructional budget

The instructional budget, accounting for the salaries of faculty, lecturers, and TAs (Teaching Assistants), is submitted twice a year, once for the 9-month academic calendar, and again for the 3-month summer calendar. A summary of expenditures under the instructional category for the last five years as provided by the Dean's office is presented in Table III-1 (expenditures for fringe benefits and TA tuition are not shown).

TABLE III-1
INSTRUCTIONAL EXPENDITURES FOR FIVE YEARS - State Funds

	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06
T/TT FACULTY + SENIOR LECT					
academic	$ 1,385,900	$ 1,564,082	$1,555,703	$1,666,324	$1,751,079
summer	152,103	210,478	142,150	175,497	178,402
subtotal	1,538,003	1,774,560	1,697,853	1,841,820	1,929,481
LECTURERS					
academic	$30,999	$15,000	$30,678	$32,840	$95,788
summer	0	5,000	5,001	19,280#	7,740
subtotal	30,999	20,000	35,679	52,120	103,528
TA support					
academic	$172,800	$236,016	$264,606	$184,126	$184,064
summer	47,430	25,608	46,779	54,662	74,688
subtotal	220,230	261,624*	311,385*	238,788	258,752
TOTAL	$1,789,232	2,056,184	$2,044,917	$2,140,349	$2,291,761

#Includes sick leave replacement salary .

*TA support budget for FY 2003 and 2004 included state RA as well as TA stipends, and figures are not strictly comparable with other years.

According to the Texas Higher Education Coordinating Board web site,[1] mean tenure-track faculty salaries at a given rank at UT-Dallas ranked the highest, or second highest, among Texas public universities in FY 2006. Since 2002, three new MCB faculty have been hired at competitive salaries. However, among MCB faculty, differences of 50% or more separate the highest and lowest salaries in each of the tenured ranks (Professor and Associate Professor), reflecting the compression of salaries among the faculty who have served the department longest. There have been no recent equity adjustments for the tenured/tenure-track (T/TT) faculty. For 13 current faculty who were in the department throughout the five fiscal years of 2002 to 2006, 10 had salaries that increased at an effective rate of only 2.1 - 3.4% per annum throughout this period.

Summer instructional funding has shifted toward paying Senior Lecturers and part-time lecturers for needed teaching. In the summer of 2006, only two T/TT faculty were paid for the teaching of organized classes. Faculty are not paid during the summer for individual instruction and mentoring of graduate and undergraduate students. The expectation is that the T/TT faculty will support themselves during the summer on grants. Since faculty with grants must pay their own salary during the summer, faculty salary buy-out during the past two academic years has been minimal, involving only one or two faculty members paying a portion of their academic year salary.

The level of the university-wide instructional budget is determined by a Texas State formula in which the number of semester credit hours (SCH) taken by students in various categories (lower level undergraduates, upper level undergraduates, masters students, and Ph.D. students) is multiplied by a factor that varies for each category. The formula income that was generated by biology courses for the year of summer 2005 through spring 2006, is calculated to be $3.5 million.[2] This amounted to about 27% of the formula income generated for the School of Natural Sciences & Mathematics, the largest percentage of any department in the school.

Teaching Assistantships

TAs currently receive $11,986 per 9-month academic year, plus $6,240 in tuition and $850 in medical costs ($19,076 total for 9-months). The take-home stipend is low compared with stipends at other Texas public institutions. For example, stipends at UT-Austin (FY 2004) and Texas A&M (FY 2005) were both about $16,000 + tuition for nine months. The weighted average stipend in 2006 for all Texas public universities was $22,951.

In the fall 2006, the departmental TA allocation will be sufficient to support 16 TAs. 13.5 students will be supported as RAs (Research Assistants) from grants or special funds. RA stipends are identical to TA stipends in dollar amount. The TA/RA support ratio this coming year is thus 1.18. In the Fall of 1993, the TA allocation was sufficient to support 25 TAs, so the number of TAs to support the growing instructional demand of the department has significantly declined during the past thirteen years, while the number of undergraduate Biology students has

[1] Data for FY 2006 from http://www.thecb.state.tx.us/

[2] From SCH data in the UTD statistical handbook and 06-07 biennial funding of $92.50/lower lever, $167.16/upper level, $425.14/masters level, and $1098.80/doctoral level SCH.

tripled.

A limited number of the incoming PhD students who are qualified are supported for two years as TAs. They are strongly encouraged to begin dissertation work with grant-funded faculty for the remainder of their degree research (about three more years) so that they can be supported as RAs. This means that the ideal TA/RA support ratio would be 2/3 = 0.67. However, it is not atypical that a student will begin work on a project whose grant is not funded in a competitive renewal application. These students are still supported as TAs by the department. Moreover the 2-year/3-year support paradigm, although backed in concept by the MCB faculty as a goal, has its downside in strict practice. It is used by the administration to justify limiting the TA budget to the department. A consequence is that, with a limited number of graduate TAs, and with larger classes taught by the T/TT faculty, teaching duties consume more faculty time. This, in turn, prejudices research, the renewal of grants, and the ability to fund RAs. Moreover, TA stipends are awarded to first-year PhD students who must perform well in core courses and in lab rotations, in order to succeed in the program. Thus, first-year students are often not as able to provide the same help to course instructors as are the more senior TAs. Finally, this low number of available teaching assistantships prevents competitive recruitment of the best graduate students.

Recently, upper administration has required that TA appointments be specified for a full 9-month period. Should a student become ineligible for TA support during this period, for academic or other reasons, or leave the program, the unused portion of the stipend reverts to the Dean's budget. Thus, there is no flexibility within the department for stipend reassignments after each semester.

One mechanism the department is using to ameliorate the situation is to recruit undergraduate TAs, who get course credit for helping to instruct a course in which they did well. There are over 50 undergraduate TAs assisting in biology courses in the fall 2006 semester. However, undergraduate TAs cannot provide the quality and extent of teaching assistance provided by graduate students.

Classified salaries and departmental operations

Summaries of the classified salaries and department operations expenditures are shown in Table III-2. The table does not include personnel salaries paid from grants; it includes only departmental personnel such as the administrative assistant, two secretaries, and other support staff paid from state funds.

Table III-2
CLASSIFIED SALARIES AND PROGRAM OPERATIONS BUDGETS FOR LAST FIVE YEARS - State Funds

	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06
Classified Salaries & wages	$ 150,507	$ 180,245	$ 144,181	$ 184,604	$ 199,479
Dept'l Operations	$91,454	$91,724	$115,486	$133,507	$141,296*

* new faculty start up funds are not included.

A breakdown of the department operations expenditures for the 2005-2006 year is presented in Table III-3. The departmental operations budget covers administrative costs, such as phone charges, copy centers, supplies for teaching laboratories, facilities and equipment maintenance by departmental engineers and the physical plant, expenses for seminar speakers, postage and office supplies. Included in this budget is an amount of $15,900 that the Dean's office funded for undergraduate research projects during the year. For the past two years, $300 has been provided for each student registered for 3-SCH of research each in a given semester.

TABLE III-3
BIOLOGY PROGRAM OPERATIONS BUDGET, 2005-2006

Phones	
Phone service	$21,580
Long distance phone charges	1,403
Copying	
Printing/copy supplies	19,838
Copy machine rental	12,341
Copy center charges (incl brochures)	5,423
Teaching laboratories (estimate)	18,000
Undergraduate research*	15,900*
Faculty labs/research	2,411
Repairs and facilities management	12,182
X-ray film developer	4,520
Computers	3,067
Travel/Seminars	
Faculty search (in addition to Dean's contribution of $19,000)	3,692
Seminars	2,259
Office supplies	5,975
Postage	3,540
Peterson's guide	1,995
Miscellaneous	7,170
Grand Total	$141,296

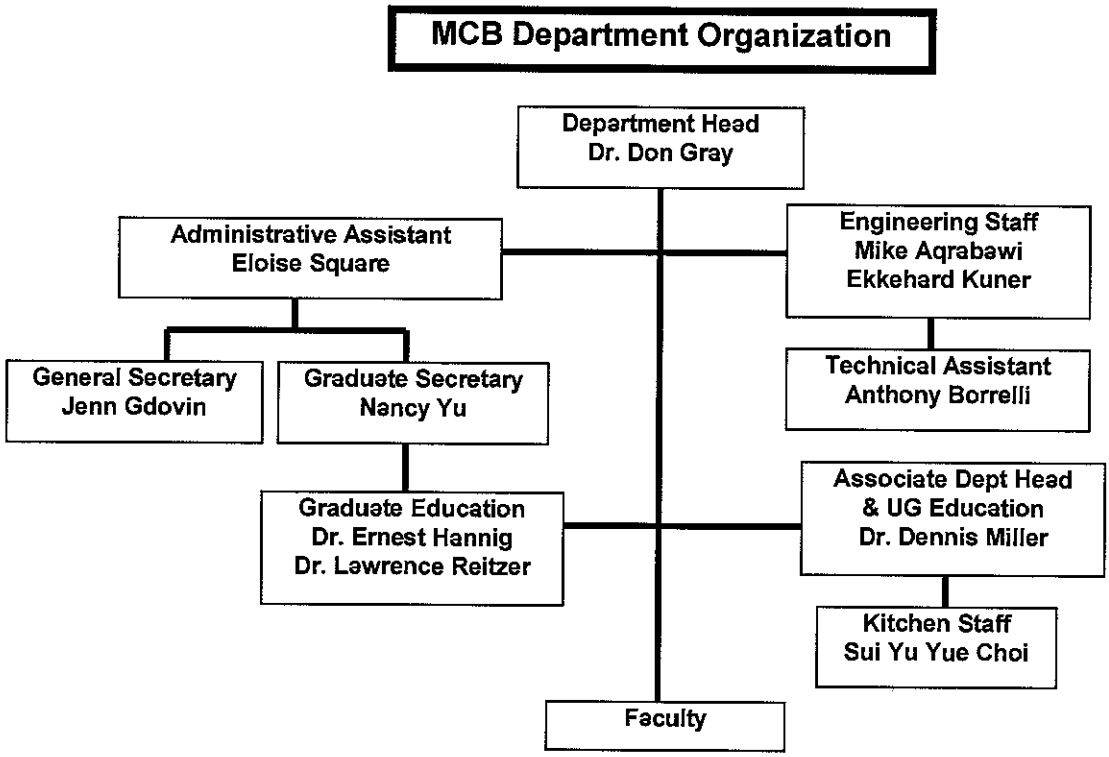
*special allocation by the Dean for UG research projects; $100/SCH

In addition to funds shown in Tables III-I and III-2, in 2005-2006 the MCB department received 14 computers from school infrastructure funds and over $60,000 to purchase equipment for the

undergraduate teaching laboratory, such as additional anatomical models and 35 new light microscopes.

Endowment funds

The department is in charge of two endowments. The *Clowes Memorial Endowment* is in honor of Dr. Royston Clowes, a former Department Head. It had an interest income of $422 in FY 2006, used to help pay for a student-invited outside lecturer each year. The *Daniel L. Harris Scholarship Endowment* is in honor of one of the founding faculty members of the department. It had an interest income of $1127 in FY 2006. This endowment is used to reward outstanding graduate and undergraduate student presentations during departmental research discussions and during an annual student-organized symposium.



IV. Undergraduate Programs

Summary of Degrees and Degree Requirements for Biology-Related Majors

Undergraduate degree programs available in the Department of Molecular and Cell Biology are listed in Table IV-1. These programs typically require between 124 and 129 semester credit hours, and are divided into general education core requirements, science courses outside biology, biology degree requirements, biology electives, and free electives. Science courses outside biology are in mathematics (calculus, multivariable calculus, applied calculus, and statistics, depending on the degree), chemistry (general chemistry, organic chemistry), and physics (calculus or algebra based, depending on the degree). All plans require Introductory Biology (BIOL 2311 and BIOL 2312) taken in the Sophomore year, Classical and Molecular Genetics (BIOL 3301), Eukaryotic Molecular and Cell Biology (BIOL 3302), and two semesters of Biochemistry (BIOL 3361 and BIOL 3362). Each of these courses is accompanied by a required workshop. All plans also require a Biochemistry Lab (BIOL 3380), and some include a requirement for a Cell Biology Lab (BIOL 4380) and for Biophysical Chemistry (BIOL 4461). Additional Biology electives range from 9-12 hours and include opportunities for Undergraduate Research (BIOL 3V96) and Honors Research (BIOL 4V96). Minors require that 12-17 hours of biology course electives be focused in a particular area.

Table IV-1. UNDERGRADUATE DEGREE PROGRAMS OFFERED BY MCB

1. BA in Biology
2. BS in Biology
3. BS in Molecular Biology
4. BA or BS in Biology with streamlined double major in Business Administration, or in Crime and Justice Studies
5. BS in Molecular Biology with streamlined double major in Business Administration, in Crime and Justice Studies, or in Biochemistry
6. BA or BS in Biology with minors in molecular and cell biology, microbiology, neurobiology, or biomolecular structure
7. BS in Molecular Biology with minors in microbiology, neurobiology, or biomolecular structure
8. Fast Track BS/MS degrees
9. BS/Doctor of Osteopathy, in conjunction with the School of Osteopathic Medicine at the University of North Texas Health Science Center in Fort Worth

There are several other degree plans offered by the department. First, double majors are available that combine either Biology or Molecular Biology with Business Administration, Crime and Justice Studies, or Biochemistry. These plans range between 129 to 140 semester credit hours and include extensive coursework in both of the chosen areas. Second, the department offers a five year fast-track plan to a combined B.S./M.S. degree. In this plan students take up to 15 hours of graduate coursework as upper division undergraduates and, together with an additional 27 hours of graduate coursework and research credits, are able to satisfy both BS and MS degree

requirements. Third, the department offers a seven year Bachelor of Science/Doctor of Osteopathy plan in conjunction with the UNT Health Science Center at Fort Worth College of Osteopathic Medicine (UNTHSC/TCOM). A student reference guide, available to students on the departmental website, describes these plans in more detail and includes a four-year worksheet of required classes. Students that emerge from these rigorous programs are well qualified for further professional training in medicine, dentistry and other health professions, for graduate work in the biological sciences, for teaching positions, and for technical (laboratory research) positions.

The relevant undergraduate catalog material, degree plans, and complete course descriptions of all the undergraduate courses offered by the department are shown in Appendix C.

Programs for pre-medicine and other pre-health students

Undergraduates who plan to attend medical school, dental school, veterinary school, or who are interested in one of the allied health professions are assisted by the Health Professions Advising Center. The Center helps students with their pre-health study plan, guides students through the medical admissions process, and organizes formal interviews with an Advisory Committee of faculty volunteers. Additional sources of information for students interested in health-related careers include the undergraduate the honorary pre-health society Alpha Epsilon Delta, the Post-Baccalaureate Pre-Health Society, and the Minority Association of Pre-Health Students. The Undergraduate Biology Club, advised by Dr. Betty Pace, also has activities to help students with career choices and to enhance student-faculty interactions. A summary of medical and dental school applications over the last five years is shown in Table IV-2.

Table IV-2. STATISTICS FOR MEDICAL AND DENTAL SCHOOL ADMISSIONS FOR BIOLOGY AND MOLECULAR BIOLOGY STUDENTS (2000-2005)*

	2000	2001	2002	2003	2004	2005
APPLICANTS (Medical School)	25	34	22	31	33	39
APPLICANTS Dental School)	6	6	7	9	12	18
ADMITTED (Medical School)	16 (64%)#	26 (76%)	11 (50%)	18 (58%)	20 (61%)	19 (49%)
ADMITTED (Dental School)	3 (50%)#	2 (33%)	4 (57%)	6 (67%)	9(75%)	12 (67%)
GPA and MCATscores of students admitted to medical school						
avg GPA (max 4.0)	3.61	3.65	3.57	3.67	3.66	3.44
avg MCAT (max 45)	28.9	28.1	26.9	28.2	28.3	26.2

* Includes only Biology and Molecular Biology majors. Biology majors account for 50% of the medical and dental school applicants from UTD, which is typical of other major universities.*
# Values in parentheses are percentages of applicants who were admitted.

About 50% of the medical and dental school applicants from UT Dallas are Biology majors, and the success of these majors in being accepted has been 50% or greater, with a growing number of successful dental school applicants.

Enrollment Patterns

In terms of student headcount, the Department of Molecular and Cell Biology is one of the largest departments on campus, and by far the largest department in the School of Natural Sciences and Mathematics. Undergraduate student enrollment in the university and in the department for the years 2000 to 2005 is shown in Table IV-3. The percentage change in the total number of students for the university was +44% while the change in the Biology Department was +64% over this period. A decline in the number of incoming freshmen who initially declared Biology/Molecular Biology as their major in Fall 2005 has been offset overall by incoming upperclass transfer students and by students who switch to biology from other majors. In the fall of 2005, Biology undergraduates accounted for 61% of all undergraduate students in the School of Natural Sciences and Mathematics (which includes Biology, Chemistry, Geosciences, Mathematics, Physics, and Science Education).

Table IV-3. UNDERGRADUATE ENROLLMENT PATTERNS (2000-2005)

	UT-Dallas			Biology Majors# and Courses		
Fall Semester	# Freshmen	# UG*	UG SCH*	# Freshmen	# UG	UG SCH
2000	1168	6439	73,838	119	476	2,514
2001	1442	7328	85,201	130	483	2,759
2002	1444	7787	92,368	155	551	3,371
2003	1553	8516	101,895	185	692	4,536
2004	1556	8904	106,230	180	765	5,836
2005	1512	9243	111,905	154	781	6,901
% Change (2000-2005)	*29%*	*44%*	*52%*	*29%*	*64%*	*174%*

* UG - undergraduates; SCH - semester credit hours
# Includes both Biology and Molecular Biology majors except for fall, 2000, when the Molecular Biology major did not exist. Not included in the table are post-baccalaureates who are taking undergraduate courses; in Fall 2005 there were 30 Biology students registered in this category.

Also notable is the fact that the total semester credit hours taught by the department increased 174% from 2000 to 2005. Requirements for courses in math, physics, and chemistry accounts for a large fraction of semester credit hours, not only within Biology but also within several other departments in the School.

Faculty/Student Ratio

While the number of undergraduate Biology majors has significantly increased over the past six years, the number of tenure-track faculty has not risen above 16. Thus, the Biology undergraduate/tenure-track faculty ratio rose to 49 in the fall of 2005 and is closer to 58 as we enter the fall 2006 semester. In the fall of 2005, the total UT Dallas undergraduate/tenure-track faculty ratio was 28 (9243 UG students/327 T/TTfaculty). Since the UT Dallas strategic plan

(http://www.utdallas.edu/strategicplan/) is to double the faculty size and achieve a student/ faculty ratio of 20 in the next 10-15 years, a focus on the recruitment of MCB faculty will be vital.

Despite the small faculty size, the MCB faculty have been committed to quality science education of undergraduates as well as of graduate students. Undergraduates have been eager to participate in learning the techniques and nature of the biomolecular and cellular laboratory sciences. During the 2005-2006 academic year nearly 50 undergraduate semester or summer-long research projects were mentored by the MCB faculty, and 26 separate projects are underway in the fall 2006 semester. In addition, during the summer MCB faculty serve as mentors for high school students, entering freshmen, and other undergraduates for a number of important programs such as the Clark Scholars Program, the Plano ISD High Tech Program, the LSAMP Summer Academy (Louis Stokes Alliance for Minority Participation, National Science Foundation) and the MIRROR Program (Minority Recruitment, Retention, and Opportunity for Research, National Institutes of Health). Faculty typically do not receive any financial compensation for mentoring students during the summer.

Present Limitations

One limitation of the small faculty numbers is a restricted ability to provide substantial individual faculty attention to students in large classes. Undergraduate lecture course class sizes have grown to the extent that enrollments exceed 100 in most sections; see Table IV-4. Weekly workshop sections are associated with these core lecture courses, with about 20 students in each workshop. However, the limited numbers of TAs available to the department and university workload rules that allow only 1/6 Teaching Load Credit (TLC) for faculty in charge of each of

Table IV-4. UG BIOLOGY CORE COURSE ENROLLMENT FALL 2006 SEMESTER

Course and name	Enrollment
BIOL 2311-001 Biology I	121
BIOL 2311-002 Biology I	82
BIOL 2312-001 Biology II	82
BIOL 3301 Molecular Genetics	186
BIOL 3302 Eukaryotic Cell Biol	109
BIOL/CHEM 3361-001 Biochem I*	149
BIOL/CHEM 3361-002 Biochem I	131
BIOL/CHEM 3362-001 Biochem II	89
BIOL 2281 Intro Biol Lab (total 5 sections)	125
BIOL 3380 Biochemistry Lab (total 5 sections)	125
BIOL 4380 Cell & Molecular Biol Lab (total 3 sections)	75
*Biochemistry courses are co-listed biology/chemistry courses; section 001 of Biochemistry I is taught by Chemistry faculty.	

multiple workshops have led to the necessity of combining workshop sessions.

Within the limitations imposed by large student numbers and a relatively small faculty and few TAs, the success of mentoring undergraduates through to completion of their degrees has been markedly above average for the university. Overall, the UT-Dallas 4-year graduation rate is about 30% according to the university's strategic plan (http://www.utdallas.edu/strategicplan/), and the goal is to achieve 50% graduation rate in 10 years. The 4-year graduation rate of Biology majors already exceeds that goal.[1] How long this rate can be maintained under the above limitations is difficult to forecast.

A second rather severe limitation is that of space. Biology core and elective undergraduate wet labs all take place in one 2700 ft^2 teaching laboratory, constructed in 1995. Dry labs involving anatomy and physiology courses take place in an additional 800 ft^2 space, which was not designed as a laboratory space to teach these courses. There are not enough offices for part-time lecturers, and no office space is presently available for TA offices, so TAs must meet students in one conference room in the department, or at their desks in the research laboratories, which raises problems with undergraduates entering a potentially hazardous area or disrupting laboratory activities. These constraints should eventually be relieved by a newly approved $27 million education building, that could be completed by fall 2009, that will focus on research-based education in mathematics, science and engineering. However, in the meanwhile, it is uncertain how teaching and mentoring of the large number of Biology undergraduate students will be managed when one-half of the present MCB research faculty are relocated to a new Natural Science and Engineering Research Laboratory (NSERL) in the coming year. NSERL has no classroom facilities and is planned to be generally closed to students who are not conducting research. The remaining seven faculty who are now in Founders Building will be moved to smaller laboratories in Berkner or the Founders Annex. These laboratories provide less than half of the space originally available in Founders and have limited facilities and equipment. Since these seven faculty have historically provided a large portion of the mentorships for undergraduate research and for programs such as the Clark Scholars Program, the High Tech Program, the LSAMP program, and the MIRROR program, these programs in particular and undergraduate research in general will be adversely impacted by this move.

Details of space issues are presented in Section IX.

[1] 77 bachelors degrees were awarded to Biology majors during the spring 2006 commencement, which was 50% of the number 155 of entering freshmen in 2002. This percentage is low because an approximately equal number of students graduate in the fall and summer semesters. Biology graduates accounted for 63% of bachelors degrees awarded in the School of Natural Sciences & Mathematics at the spring 2006 commencement.

V. Graduate Programs

Our graduate programs have a long history that predates the founding of UTD as an academic institution. The faculty have always paid thoughtful attention to their students, being keenly aware that the strengths of the teaching and of the externally funded research endeavors of the department are intertwined with the quality of its graduate programs and students. Issues regarding the graduate programs have been among the most debated in the department. Some of these have been a result of circumstances out of our control (9/11 and its effect on the recruitment of quality foreign students, and UTD's inability to maintain graduate stipends at a competitive level). Others are due to internal circumstances (the inability of a number of laboratories to fund students as research assistants, which limits the number of research opportunities, and the need to clarify rules for awards of stipends). Summaries of degrees and degree requirements, student enrollment and retention data, and current challenges are presented below.

Summary of Degrees and Degree Requirements

The MCB department offers a Masters degree in Biology or Molecular Biology and a PhD on Biology or Molecular Biology. In the spring of 2006, the administration of the the Masters degree in Biotechnology Program was transferred from the Dean's office to the MCB department. The three current graduate degree offerings are listed in Table V-1.

Table V-1. GRADUATE DEGREE PROGRAMS OFFERED BY MCB

1. MS in Biology or Molecular and Cell Biology
2. PhD in Biology or Molecular and Cell Biology
3. MS in Biotechnology

PhD Degree Requirements

Core Courses for PhD

In their first year, most students take a series of core courses. These courses provide basic knowledge of biology with emphasis on molecular aspects. The following core courses are mandatory for PhD students:

BIOL5410	Biochemistry of Proteins and Nucleic Acids (Fall)
BIOL5420	Molecular Biology (Fall)
BIOL5V50	Methods in Molecular & Cell Biology I (Fall)
BIOL6193	Colloquium in Molecular & Cell Biology (Fall)
BIOL5430	Macromolecular Physical Chemistry (Spring)
BIOL5440	Cell Biology (Spring)
BIOL5V51	Methods in Molecular & Cell Biology II (Spring)
BIOL6V02	The Art of Scientific Presentation (Spring)

Laboratory Rotations

During the first year at UTD, all students admitted to the PhD program will rotate in one lab each semester. Research is the main focus of graduate study at UTD. To gain exposure to diverse research environments, students rotate through two different laboratories during their first nine months in the program. They participate in the formulation, execution and analysis of scientific work being conducted in the host laboratory. These rotations provide a basis for selection of a thesis advisor and dissertation topic. Each advisor provides a written evaluation of the student's performance during the rotation and of their research potential.

Other Courses

General Electives

A PhD student is required to take a minimum of four general elective courses, for a minimum of nine SCH. Students consult with their advisor in choosing the courses most appropriate for their studies.

Special Electives

These are colloquium courses for small groups, in which the research of faculty and students and recent literature are analyzed and discussed. Participation in these courses is particularly important for PhD students.

Teaching requirement

All PhD students serve as teaching assistants for a minimum of two semesters. This is intended as an educational as well as professional experience. The department considers teaching experience to be an integral part of the graduate program.

Evaluation of First Year Students

Students who have completed the 8 mandatory core courses, with a minimum "B" grade in each of the four core lecture courses (BIOL5410, 5420, 5430, and 5440), are evaluated by the Faculty in May of the first year.

The faculty evaluates aspects of the student's first year that include, but are not limited to, the following:

1. **Core course performance**
2. **Laboratory Rotations**
3. **Performance as teaching assistants**

Students are ranked based on a faculty vote and teaching stipends are awarded accordingly.

Supervising committee

Students accepted into laboratories for dissertation research select, in consultation with their thesis advisor, a thesis committee consisting of three additional faculty members (by mutual agreement with the particular faculty members).

Qualifying Examination

PhD students are required to pass a Qualifying Examination (QE) before admission to PhD candidacy. The QE in the Department of Molecular and Cell Biology consists of a detailed written research proposal on the subject of the student's dissertation topic and an oral defense of the research proposal. The QE examining committee consists of three Biology faculty who are members of the supervisory (thesis) committee (excluding the supervising professor) plus three additional Biology faculty chosen at random. After the defense of the proposal is completed, the chair of the exam opens the floor to any general questions the examining committee may have about general breadth and background knowledge not necessarily related to the proposal. This part of the exam is to give the committee an opportunity to assess general research knowledge of the candidate. After the exam, the committee discusses the defense and vote by secret ballot as to whether the student has passed the exam. At least four of the six voting members of the examining committee must vote in favor of passing for the student to pass.

Further Requirements for the PhD degree

After passing the Qualifying Examination, the student continues formal dissertation work, with the guidance of the Supervising Committee. All students are required to present one paper per year, on a topic unrelated to their main area of research, during the department's journal club meetings. All students present their research progress once a year during the department's research discussion meetings. Following the presentation, the Supervising Committee meets formally with the student to discuss his/her progress in detail and then transmits a Supervisory Committee Report to the Program Head and the Graduate Dean. The Committee decides when the student's research achievements are adequate for a dissertation.

Publication requirement

The standards for granting of the PhD degree from the Department of Molecular and Cell Biology include a requirement that all students have, either in press or published, a manuscript based upon their thesis work.

MS in Molecular & Cell Biology Degree Requirements

Classification

A student entering the program with intent to work for a Master's degree, or a student not passing the first-year student evaluation, will be classified as an MS student.

[Within the past academic year, the faculty approved a reduction from 42 to 36 in the number of required credit hours for the MS degree.]

MS Laboratory Research Thesis

Required graduate-level courses:

16	credit hours in Core Courses (BIOL410, 5420, 5430, 5440)
1	credit hour in BIOL6193 (Colloquium)
6	credit hours (minimum) in graded General Electives
10	credit hours in BIOL8V0l (Research in Molecular Biology)
3	credit hours in BIOL8398 (Thesis)
36	credit hours in total Biology courses

Non-thesis MS degree

MS students who seek instruction in biology for expansion of their professional background may obtain the MS degree without a thesis if they satisfactorily complete the following graduate courses with a minimum of 36 credit hours:

16	credit hours in Core Courses (BIOL410, 5420, 5430, 5440)
9-12	credit hours in graded General Electives (minimum of 4 courses)
8-11	credit hours in General Electives or other appropriate courses (P/F or graded)
36	credit hours in total

Core Courses for MS in Molecular and Cell Biology

The following core courses are mandatory for all MS students:

BIOL5410	Biochemistry of Proteins and Nucleic Acids
BIOL5420	Molecular Biology
BIOL5430	Macromolecular Physical Chemistry
BIOL5440	Cell Biology

Supervising Committee

For Master's degree students (with thesis), the Supervising Committee consists of the Supervising Professor plus two additional Biology Faculty members.

Continuation to PhD

Students who have obtained a terminal MS degree may later wish to pursue a PhD degree. In this case, students must re-apply for admission to the PhD program.

MS in Biotechnology Degree Requirements

The MS degree in biotechnology is intended to prepare students for careers in biotechnology and to assist currently employed professionals in enhancing their career opportunities in the field of biotechnology. The MS in Biotechnology is designed so that students may enter the program with a wide range of prior disciplinary backgrounds, prepare for and take the four core courses, and, by choice from a wide range of approved electives, tailor the remainder of the degree program to their career preferences. In this manner, students may develop areas of additional depth in fields such as:

- molecular and cell biology
- chemistry
- engineering and computer science
- health care policy
- management and business administration

The MS in Biotechnology requires 36 hours of courses, typically twelve courses of three semester hours each. Students may also elect to prepare and defend a thesis; more than 36 hours may be required for such a program.

The program is open to all students who hold a bachelors degree, although those with laboratory science, mathematics, computer science, or engineering degrees are particularly encouraged to apply. In general, students will not be admitted to the MS in Biotechnology program if they require more than two courses in order to be ready to take the core courses. Applications to the program are reviewed by Drs. Gray, Hannig, and Miller, and Drs. Gray and Miller advise the accepted students on their degree plans. A 10-member interdisciplinary advising committee, including faculty from the School of Economic, Political and Policy Sciences, the School of Engineering and Computer Sciences, and the School of Management, meets as needed to consider broader issues of the program.

There are no formal prerequisites for most of the core courses, and a student, after obtaining consent of the program advisor, may attempt one or more core courses. However, the level of the BIOL core courses is such that most students will want to have mastered the material in the following courses:

General Chemistry (two semesters, with lab)
Organic Chemistry (two semesters, with lab)
BIO 2311 Introduction to Modern Biology I (with workshop)
BIOL 3361 Biochemistry or BIOL 6352 Modern Biochemistry I
BIOL 3301 Classical and Molecular Genetics or BIOL 6V31 Molecular Genetics

Core Courses for MS in Biotechnology

The core consists of four courses: BIOL 5381 Genomics, BIOL 6373 Proteomics, BIOL 6384 Biotechnology Laboratory, and either BIOL 5376 Applied Bioinformatics or an approved course in bioinformatics in the departments of mathematics or computer science. Students who can demonstrate that they have acquired the material and/or skills in a core course may petition the Committee on Biotechnology for permission to substitute an approved elective course.

Enrollment and Retention Patterns

The department, for its size, has a remarkable history of placing its doctoral graduates into prestigious postdoctoral positions. Many of these graduates have moved to academic positions or positions in industry and one has even been elected as a member of the National Academy of Sciences. (A summary of positions held by graduates since 1999 is shown in Appendix E.) Early in the year 2000, we recognized that the graduate student stipend ($13,800/year) was no longer competitive with stipends at other similar institutions. Our department made a proposal to the school that the number of teaching assistantships assigned to our department be reduced in exchange for an increase in the level of the stipends. The stipends were indeed increased to a level of $18,000/year that was more competitive at the time. Unfortunately, the annual increases since then have failed to keep these stipends comparable to those of other institutions and the take-home stipend (excluding tuition and medical) is now only $15,980 per year. One additional

issue is the fact that the number of Teaching Assistantships has not grown in pace with the growth in our undergraduate programs, increasing the amount of work expected from our students on TA stipends. On a positive note, UTD has changed its policy with respect to charging students for tuition. The student's tuition and health insurance are now covered for a period of ten long semesters, if the student has a stipend.

The number of students enrolled in our masters and PhD programs has remained fairly stable for the last six years (Table V-2). The recently added Masters in Biotechnology has attracted a reasonable number of new students into our program with 5 new students in the first year and 16 students enrolled in the second year. There are over 30 students in the MS in Biotechnology program in the fall of 2006 (not yet tabulated in the university's statistical tables, from which the data for Table V-2 were taken). The number of students enrolled in the Masters in Molecular Biology programs averaged 34 with a low of 24 (2002) and a high of 45 (2005). Similarly, the number of students enrolled in our PhD program has averaged 17, with a low of 13 (2000) and a high of 21 (2002). Data obtained by tracking students who have entered the program for the past seven years show that the attrition level was a maximum of 50% for students who entered in the fall of 2004 (Table V-3). Over the same time period, an average of 65% of the students who entered the program completed either an MS or PhD degree or are still enrolled.

Data on applicants for the past two years are shown in Tables V-4 and V-5 to document the numbers of students accepted/rejected and their countries of origin. The largest contingent who are not US citizens are from India.

The output of Masters students has ranged from 4 to 11, while the number of PhD students receiving their degrees has ranged from 3 to 6 per year for the past four years (Table V-6).

Table V-2 GRADUATE STUDENT ENROLLMENT PATTERNS (2000-2005)

	NS&M		MCB		
Fall Semester	**MS**	**PhD**	**MS**	**PhD**	**MS in Biotech**
1999	**126**	**127**	**34**	**15**	**NA**
2000	**147**	**98**	**38**	**13**	**NA**
2001	**159**	**102**	**34**	**17**	**NA**
2002	**165**	**123**	**24**	**21**	**NA**
2003	**185**	**122**	**27**	**15**	**NA**
2004	**234**	**150**	**33**	**20**	**5**
2005	**266**	**115**	**45**	**11**	**16**

Numbers for MCB do not include graduate non-degree students, of which there were 48 in MCB and 80 in NS&M in the fall 2005 semester. Students are in various stages of degree programs and numbers also include students who may be attrited

Table V-3 STUDENTS TRACKED: ATTRITION AND DEGREES AWARDED (1999-2005; Data as of Spring 2006; Excludes MS in Biotechnology)

Fall Semester	# Students (new since previous fall)	Ave GRE*	Attrited	MS**	Years to MS	PhD	Years to PhD	Still Enrolled Spring 2006
1999	14	1179	2 (14%)	9	2-3	3	3#-7	0
2000	12	1171	5 (42%)	4	2-3	2	4-5	1
2001	17	1085	7 (41%)	7	1-3	1	3.5	2
2002	7	1168	2 (28%)	4	1-3	1	4	0
2003	15	1145	7 (47%)	2	1-2	0	-	6
2004	18	1290	9 (50%)	1	2	0	-	8
2005	23	1147	6 (26%)	0	-	0	-	17

* Of all new students
** Terminal MS degrees
# 3 years after MS degree

Table V-4 APPLICANTS AND ACCEPTED STUDENTS MS AND PHD DEGREE PROGRAMS IN MCB (2005 and 2006)

Fall Semester	Number of Applicants*	Accepted (Rejected)	MS Accepted	MS Matriculated	PhD Accepted	PhD Matriculated
2005	74	67 (7)	23	11	44	14
2006	110	61 (49)	20	8	41	14

* Includes MS students reapplying to enter the PhD program

Table V-5 COUNTRY OF RESIDENCE OF ACCEPTED (MATRICULATED) STUDENTS MS AND PHD DEGREE PROGRAMS IN MCB (2005 and 2006)

Fall Semester	USA	India	PR China	Taiwan	Korea	Other
2005	16 (7)	27 (10)	11 (1)	7 (6)	2 (0)	4 (1)
2006	17 (9)	23 (7)	12 (1)	4 (2)	0	5 (3)

Table V-6 MS AND PHD DEGREES AWARDED

Calendar Year	MS Graduated	PhD Graduated
1999	not available	7
2000	not available	2
2001	not available	0
2002	5 (all terminal MS)	5
2003	4 (all terminal MS)	3
2004	11 (includes 1 interim MS)	6
2005	9 (includes 3 interim MS)	6

Challenges

First, our department needs to step up its recruitment of top quality students from the US and from outside the country to maintain the viability of our graduate programs. This will require changes both internal and external to our department. Graduate stipends need to increase in both level and number. One logical suggestion is that we tie our stipends to those of UT Southwestern, which is now $25,000 per year, plus tuition and medical insurance.[1] It is particularly appropriate for the Molecular and Cell Biology Department to use UTSW as a guideline since we compete for the same pool of students. This would require an increase of $9,000 in the take-home stipend. The policy of not charging our stipended students for tuition and health insurance should be maintained. In addition, the MCB department urgently needs additional Teaching Assistant positions commensurate with its substantial increases in enrollment and course offerings. At the same time, students progressing to their third year should be supported by grant-originated Research Assistantships, making more TA positions available for new students. (Exceptions should only be made for students in laboratories that have recently lost outside support.) The present shortage of Research Assistantships will only be eased as additional faculty are recruited and grant funding increases. Increasing the number of new faculty in our department will also help expand students' choices of viable laboratories in which to conduct research. In the meanwhile, funds should be sought for recruitment efforts, such as bringing students to campus for visits. This past summer, money was available for the first time in several years to pay for listing the graduate programs in Petersons Guides and for printing of a departmental brochure, but the departmental budget has been cut for the coming fiscal year.

Second, student morale has been low for several reasons. (1) Entering students who are supported by TAships have heavy responsibilities with both heavy teaching duties and core course demands. The demands of different laboratories in which the students do first year rotations have varied, and some students have felt that the PIs were not sensitive to the conflicting demands of lab rotations and course work. (2) The procedures for allocation of

[1] It should be noted that a limited number of Excellence in Education Fellowships based on academic qualifications are available through the Dean's office for US citizens that amount to $4,000 per semester supplement to the stipend for up to two years. Three students in the department now hold such fellowships, and a fourth has been applied for.

stipends was sometimes not clear. (3) Another recurring student complaint has been that faculty attendance at student presentations has been low.[2]

Some underlying problems here are that (i) there are not enough stipends to cover all students who are qualified and they look elsewhere to universities that will support them, (ii) sudden upper-administrative changes and restrictions in TA stipend awards have forced unexpected last-minute changes, and (iii) faculty are not always able to attend or spend time at faculty meetings and student evaluation meetings to discuss stipend allocations and issues. Clear rules do need to be communicated to the students, and our ability to adhere to these rules must be backed by predictable and sufficient administrative funding of TA stipends. To further address student morale, a number of steps have been instituted during the past year, including reinstituting stipend award letters to each student, informing the students of any changes in the award guidelines (usually determined by upper administration), revising the graduate student guidelines (just completed), having monthly social meetings of the faculty and students (organized by Dr. Reitzer), combining student presentations into a single weekly meeting, and making sure that all stipends have essentially the same value (previously the TA stipend budget was used to support some partial stipends). However, important issues remain to be addressed, including procedures for mentoring incoming students, the evaluation of first year students, and reassessing the core courses in the program. These issues are in addition to a need for more vigorous graduate student recruitment.

[2] Taken from a report of the Biology Graduate Student Organization to the faculty, June, 2005, and meetings with the student representatives.

VI. Teaching Workload

Teaching Workload During the Academic Year

The Board of Regents of the UT-System has set a minimum teaching workload for all full-time tenure-track faculty of an average of nine semester Teaching Load Credits (TLC) of courses in each of the two academic year semesters (18 TLC in total). One TLC is generated by teaching one undergraduate course hour, normally one 50-minute "hour" of lecture per week, or two hours of laboratory. Undergraduate classes with an enrollment of more than 60 students have a factor that increases the TLC. Teaching a class of 100 undergraduates generates 1.5 TLC per course hour. One graduate-level course hour also generates 1.5 TLC. Of the 18 required TLC, six at most (1/3 of the total) may be fulfilled by individual student instruction, at the rate of one TLC per five PhD or MS-level graduate research hours, or per ten undergraduate research hours. (PhD dissertation hours generate TLC at the rate of one TLC per three hours, and MS thesis hours generate TLC at the rate of one TLC per six hours of individual instruction.) These calculations are Regent policy and are published in the UTD Faculty Handbook as policy memorandum 76-111.23-5 "Minimum faculty academic workload requirement".

The teaching workload for full-time Senior Lecturers is 12 TLC per semester (24 TLC per academic year) and is one-half this requirement for part-time lecturers with 50% appointments.

Tenure-Track Faculty Workload and Waivers

The teaching workload may be attenuated by two factors. **First**, a faculty member can buy back salary using funds from grants, which diminishes the required number of TLC in proportion to the fraction of salary furnished. However, summer salary also has to be paid from grants and there is limited buy-back during the academic year. **Second**, some administrative duties warrant a reduction in teaching workload; for example, the Program Head qualifies for a 50% decrease in formula teaching. The Dean may grant additional teaching waivers to faculty who run large research projects and support students on grants. Generation of TLC to make up the MCB faculty workload for the 2005-2006 academic year is illustrated in Table VI-1. Note that, of the individual instruction hours listed, a maximum of six may be used to satisfy any faculty member's required eighteen TLC per year. Also, workload reductions and grant buy-back count as 2/3 towards the organized class requirement and 1/3 counts as individual instruction. (For example, a workload reduction by 6 TLC means that the organized class requirement is reduced by 4 TLC, while the individual instruction requirement is reduced by 2 TLC. Thus, the total workload may be effectively reduced by only 4 TLC for a faculty member who does a lot of individual instruction.)

New faculty are typically allowed a 50% teaching workload waiver by the Dean only during the first year.

The organized class workload requirement has been largely satisfied by teaching needed core courses and graded electives, some with very large enrollments (Section IV). Flexibility internal to the department in assigning less heavy organized class workload duties is limited to three courses in the fall semester and two courses in the spring semester. TLC for overseeing

laboratory rotations is preferentially assigned to new faculty who are being eased into full teaching duties.

Less heavy workload duties in the department:

Organizing Journal club and research discussion	3 TLC each semester
Organizing Faculty colloquium for new students	1.5 TLC in the fall semester
Overseeing undergraduate TA apprentices	3 TLC each semester
Overseeing laboratory rotations	4.5 TLC each semester (allocated to a new faculty member)

One efficiency we have tried to implement has been to combine appropriate graduate and UG course offerings in one venue. This would conserve precious faculty time and classroom space while offering elective options to undergraduates (if the course is a core graduate course) or to graduate students (if the course is a core undergraduate course), and elective options could be offered to both groups of students. Of course, the learning objectives and assessments have to differ for the two groups of students, but students could be simultaneously instructed and involved in discussions. However, concurrent course instruction of graduate and undergraduate students is strongly discouraged by the Provost's office by means of a formula that assigns a greatly reduced workload for the combination of courses.[1] This penalty is a UTD procedure, not Regents policy, nor is it listed in the Faculty Handbook. The absence of concurrent instruction apparently facilitates record-keeping for the Texas Coordinating Board and for the Southern Association of Colleges and Schools (SACS). UT Dallas is currently undergoing a reaccreditation review by the latter agency.

For the 2006-2007 AY, there have been no waivers allowed by the Dean for research, and the total workload required of the faculty has been increased. Even if concurrent instruction would be allowed, the number of separate courses is projected to be no fewer than as shown in the last column of Table VI-1 (This conservative number is equivalent to 3-SCH undergraduate courses, without including a large course weighting factor and excluding the less heavy duties above). Without full workload credit for concurrent courses, some faculty will have to spend an additional three hours per week in class meetings (teaching similar course material) to satisfy the organized class workload requirement, and some classes will have to be eliminated from the schedule.

Historically, there has been no teaching waiver allowed for advising MCB graduate students. Since the administration of the MS in Biotechnology program was transferred to MCB there has

[1] The formula is TLC = [u/(u + g)] × 3 × (large course factor) + [g/(u + g)] × 4.5, where u is the number of undergraduate students and g is the number of graduate students. A current example is that a graduate course in Proteomics (which is a core course for the MS in Biotechnology students) has an enrollment of 32 while 16 undergraduates are taking the (separately assessed) instruction as an elective. The courses individually provide a workload of 4.5 TLC (for the graduate course) and 3.0 TLC for the undergraduate course, or 7.5 TLC in total. According to the Provost's formula for concurrent instruction, the workload generated by the undergraduate students is (16/48) × 3.0 TLC = 1.0 TLC, and the workload generated by the graduate students is (32/48) × 4.5 TLC = 3.0 TLC, for 4.0 TLC total. This is less than the workload for teaching just the graduate students, and the formula effectively penalizes the faculty member by 3.5 TLC for instructing the undergraduate students.

been no waiver allocated for advising MS in Biotechnology students, and none has been awarded for the 2006-2007 AY, although there was a waiver applied when the program was administered by the Dean's office.

Overall, the teaching duties of the faculty have increased for the 2006-2007 AY. Within the department, there is no flexibility that allows managing the teaching workload in association with other duties, such as graduate student advising, chairing faculty searches, organizing materials required by SACS (Southern Association of Colleges and Schools), or other duties.

Senior Lecturer Workload

The workload for the three full-time senior lecturers, Drs. John Moltz, Scott Rippel, and Ilya Sapozhnikov, is typically much greater than the required 24 TLC per AY. During 2005-2006, these three faculty carried workloads of 28.9, 33.6, and 42.9 TLC, respectively. Dr. Rippel's workload includes overseeing the teaching laboratories in the absence of a staff laboratory manager. It credits 6 TLC to his workload, but he teaches a full load in addition. Other part-time lecturers generally teach the minimum of 12 TLC per AY, or proportions appropriate to the % appointment. Other than Dr. Robert Marsh, who will be on Senior Lecturer status for 2005-2006 following his retirement, the department has not been allowed to appoint additional Senior Lecturers since 2001, although that would greatly facilitate the teaching schedules and ease the overall teaching burden.

Total Faculty Teaching Equivalents and Student Enrollment

With an undergraduate major population of 781 in the fall of 2005 (FY 2006), and 923 in the fall of 2006 (FY 2007), the undergraduate/tenure-track faculty ratio has risen from 49 (781/16) to 58 (923/16), as pointed out in a previous section. If one takes into account the actual FTE faculty available at all ranks (along with the reduction in FTEs due to tenure-track faculty waivers, but not due to buy-back which has been < 1 FTE), the number of FTE is only 17 to 20, as documented in Table VI-2. Even if one simply adds the number of 6-7 part time faculty to the number of 16 tenure-track faculty, the undergraduate student ratios in the fall of 2006 and 2007 were 36 (781/22) and 40 (923/23), still far above the targeted student/faculty ratio of 20 needed for quality education, while the faculty attempt to reach a higher level of research productivity.

Furthermore, these numbers do not account for teaching and supervising the large numbers of graduate students in the department, of which there were a total of 72 in the fall of 2005 and over 90 in the fall of 2006.

Special Challenges in an Experimental Science

Students in MCB, at both the undergraduate and graduate levels, should have laboratory experience. Space limitations with respect to teaching the formal undergraduate core laboratories were commented on in Section IV, and there is also no adequate space for teaching a required graduate laboratory course (BIOL 5384) in the MS in Biotechnology program, although space for a future laboratory in Berkner has recently been set aside by the Dean. Details of research and teaching lab space issues are presented in Section IX.

TABLE VI-1
TEACHING LOAD CREDITS FOR 2005-2006 AY
(DATA COMPILED FOR FACULTY ANNUAL REPORTS)
AND # COURSES PROJECTED FOR 2006-2007 AY

Faculty Member	Reductions 2005-2006	Type of Course	TLC 2005-2006	Reductions 2006-2007	# separate courses 2006-2007 (minimum) *
Breen, G.	None	Organized Courses Indiv. Instr.	17.6 1.6	None	3.75
Bulla, L.	3 TLC research waiver	Organized Courses Indiv. Instr.	14.7 0.8	None	4.0 +
Burr, J.	None	Organized Courses Indiv. Instr.	20.7 3.3	None	4.0 +
DeJong, J.	6 TLC research waiver	Organized Courses Indiv. Instr.	8.9 4.8	None	2.0 +
D'Mello, R.	6 TLC research waiver 7.6 TLC buy-back	Organized Courses Indiv. Instr.	3.0 10.5	None	2.75
Draper, R.	None	Organized Courses Indiv. Instr.	16.2 4.0	4.0 TLC buy-back	2.5 +
Gonzalez, J.	9 TLC as Associate Dean	Organized courses Indiv. Instr.	6.0 13.9	4.5 TLC as Associate Dean (est)	2.0
Goodman, S.	18 TLC as Director of IBMST	Organized courses Indiv. Instr.	9.8 17.6	18 TLC	2.25
Gray, D.	9 TLC as Department Head	Organized courses Indiv. Instr	6.8 3.4	9 TLC as Dept Head	1.5
Hannig, E.	None	Organized Courses Indiv. Instr.	18.0 2.6	None	5.3 +
Levene, S.	None	Organized Courses Indiv. Instr.	16.2 5.2	None	3.0 +
Marsh, R.	6 TLC as Assoc Department Head and UG Advisor	Organized Courses Indiv. Instr.	15.6 4.4	NA (Senior Lecturer)	NA
Miller, D.	None	Organized Courses Indiv. Instr.	17.3 8.8	6 TLC as Assoc Depart Head and UG Advisor	2.0 +
Pace, B.	9 TLC as Director of Sickle Cell Research Center 9 TLC buy-back	Organized Courses Indiv. Instr.	0 7.4	9 TLC as Director of SCRC 9 TLC buy-back	2.0
Reitzer, L.	18 TLC on Faculty Development Leave	Organized Courses Indiv. Instr.	0 2.8	None	2.0 +
Xia, T.	9 TLC New Faculty waiver	Organized Courses Indiv. Instr.	12.0 6.0	None	1.5
	TLC Totals for 16 T/TT faculty	Organized Courses Indiv. Instr. Waivers & buy-out	181.1 97.1 109.6		

* This mimimum number counts potential concurrent course offerings only once.
" + " indicates that one or more of the courses will be a large class of over 100 students and require running multiple workshops.

In addition, there is a need to accommodate rather large numbers of undergraduate as well as graduate students conducting research projects in individual laboratories. During the 2005-2006 AY, there were 42 undergraduate research projects being mentored in the department. An additional 16 projects, by undergraduates and high school students, were carried out in the summer of 2006. This essential mentorship of students in an experimental science adds to the total teaching workload of the faculty. Hoverer, the individual instruction workload credit generated by each undergraduate 3-SCH project is only 0.3 TLC. The individual instruction of graduate and undergraduate students conducted during the summer of 2006 amounted to 31.7 TLC, without state salary, and is ignored in calculating the faculty teaching workload.

TABLE VI-2
FULL-TIME TEACHING (FTE) FACULTY EQUIVALENTS IN MCB

Faculty	FTE for 2006 FY	FTE for 2007 FY
Tenure-Track		
Breen	1	1
Bulla	0.835	1
Burr	1	1
DeJong	0.67	1
D'Mello	0.67	1
Draper	1	1
Gonzalez	0.67	0.75 (est)
Goodman	0	0
Gray	0.5	0.5
Hannig	1.0	1.0
Levene	1.0	1.0
Marsh	1.0	0
Miller	1.0	1.0
Pace	0.5	0.5
Reitzer	0	1
Spiro	0	0.25
Xia	0.25	1.0
FTE T/TT faculty	**11.095**	**13.25**
Senior Lecturers		
Cirillo	0.375	0.375
Moltz	1.0	1.0
Rippel	1.0	1.0
Sapozhnikov	1.0	1.0
Marsh	0	0.25
FTE Senior Lecturers	**3.375**	**3.625**
Part-Time Lecturers		
Borokov	0.375	0.5
Candas	0	0.34
Friedman	0.375	0.5
Lin	0.5	0.5
Robinson	0.5	0.5
Truong	0.375	0
Yu	0	0.375
Zhou	0.415	0.415
Watts/Gill- King	0.166	0.125
FTE lecturers	**2.706**	**3.255**
FTE Grand total	**17.176**	**20.13**

VII. Research and Centers

Faculty research areas

Scholarly work in the MCB department is interdisciplinary and encompasses the areas of functional genomics, proteomics, animal models of disease, bioinformatics, and structural biology. Research projects comprise work on eukaryotic and prokaryotic gene expression and gene regulation, genetic recombination, mitochondrial biogenesis and gene expression, sickle cell anemia, neurodegeneration, mammalian cell toxins, insecticidal toxin receptors, microbial pathogenesis, signal molecules in bacteria-plant symbiosis, enzymology, bionanotechnology, and structures of proteins, membranes, and DNA-protein complexes. Areas of research interests of the tenure-track faculty overlap, but a rough division into broad areas is as follows:

- Eukaryotic gene expression/biochemistry – **Breen, Bulla**, DeJong, **Miller**
- Prokaryotic gene expression/biochemistry – **Bulla,** González, **Hannig**, Reitzer, Spiro
- Cell biology - **Breen**, Burr, D'Mello, **Draper**, Goodman, **Pace**
- Physical biochemistry - Levene, **Gray**, Xia

The groups of faculty that can interact are very small, and they will be separated by the planned division within the next year of the faculty into facilities in NSERL and Berkner Building. (**Names in bold** above are faculty who will probably have lab space in Berkner or the adjacent Founders Annex. Dr. Burr currently has no laboratory space, but he actively participates on student supervisory committees, as do all the faculty in an interdisciplinary manner.) This planned separation of the faculty is a point of particular concern.

The areas of research and expertise are more specifically indicated below and summarized in the faculty CVs (Appendix B).

Gail A. M. Breen, Ph.D. (neuroscience), UCLA. Biogenesis of the mammalian mitochondrial oxidative phosphorylation system, regulation of mitochondrial gene expression, and analysis of the mitochondrial proteome.

Lee A. Bulla, Ph.D. (microbiology and biochemistry), Oregon State U. Invertebrate and microbial molecular biology, with particular focus on biochemical and biophysical characterization of insecticidal toxin receptors in insects.

John G. Burr, Ph.D. (molecular biology), UC Berkeley. Eukaryotic cell-growth regulation and oncogensis; oncogenic transformation of cells by Rous sarcoma virus.

Jeff L. DeJong, Ph.D. (biochemistry), Pennsylvania State U.. Factors and mechanisms responsible for the transcription of eukaryotic genes.

Santosh D'Mello, Ph.D. (biology) U. of Pittsburgh. Regulation of apoptosis (programmed cell death) in neurons of the mammalian brain.

Rockford K. Draper, Ph.D. (biological chemistry), UCLA. Molecular pathogenesis of protein toxins, such as cholera toxin, membrane trafficking in eukaryotic cells, and

bionanotechnology.

Juan González, Ph.D. (microbiology and molecular genetics), UCLA. Role of exopolysaccharides in the nodulation of legumes by rhizobia and the molecular genetics of plant-microbe interactions.

Steven Goodman, Ph.D. (biochemistry), St. Louis University Medical School. C. L. and Amelia A. Lundell Professor of Life Sciences. The spectrin membrane skeleton, a macromolecular structure on the cytoplasmic surface of eukaryotic membranes; sickle cell disease.

Donald M. Gray, Ph.D. (molecular biophysics), Yale. Structures of polynucleotides and DNA-protein complexes studied by circular dichroism spectroscopy.

Ernest M. Hannig, Ph.D. (molecular genetics and microbiology), Rutgers. Protein-protein interactions; genetic and biochemical analysis of translation initiation factors; protein synthesis and its regulation in eukaryotes.

Stephen D. Levene, Ph.D. (chemistry), Yale. Protein-DNA interactions in site-specific recombination and the structure and dynamics of nucleic acids in solution.

Dennis L. Miller, Ph.D. (biochemistry), U. of Iowa. Structure and organization of mitochondrial DNA, mitochondrial gene expression, RNA editing, and mitochondrial biogenesis; extent and mechanism of RNA editing as a step in the mitochondrial gene expression of Physarum polycephalum.

Betty Pace, M.D., Medical College of Wisconsin. Design of novel treatments for sickle-cell disease; molecular mechanisms involved in fetal hemoglobin synthesis; signal transduction pathways that mediate gamma gene reactivation.

Lawrence J. Reitzer, Ph.D. (molecular and cell biology), Washington U. (St. Louis). Regulation of gene expression and metabolism in Escherichia coli and pathogenic bacteria; pathways of the catabolism of polyamines; function of transaminases.

Stephen Spiro, Ph.D. (molecular biology), U. of Sheffield, UK, Regulation of bacterial gene expression by environmental signals, and the consequences of gene regulation for physiological adaptation to stress.

Tianbing Xia, Ph.D. (biophysical chemistry), U. of Rochester. Molecular recognition; biomolecular structures, folding and dynamics; correlations between structures, energetics, dynamics, and functions of important biomolecules; development of a technique using ultrafast laser spectroscopy to capture molecular movements.

Faculty recruiting

The last two faculty hires were Drs. Tianbing Xia (2005) and Stephen Spiro (2006). Searches are underway for two more faculty, at any rank, in the broad areas of cell biology and biomolecular structure. Further faculty hires could be in these and other areas that both strengthen the groups in the MCB department and at the same time offer collaborations with faculty in the School of Engineering and Computer Science, in the School of Behavioral and Brain Sciences, and at UT-Southwestern Medical Center.

Centers and Institutes

The following sections on the Southwestern Sickle Cell Center, the UTD Sickle Cell Disease Research Center, the Institute of Biomedical Sciences and Technology, the Center for Applied Biology, and a new collaborative effort in Bionanosciences illustrate the broad scope of MCB faculty interests and the most recent efforts of faculty to obtain funding other than individual investigator-initiated grants.

Southwestern Sickle Cell Center

In 2001, President Franklyn Jenifer created the UT Dallas Sickle Cell Disease Research Center and made Dr. Steven Goodman its Director. Dr. Goodman, working with Dr. George Buchanan and colleagues at UT Southwestern Medical Center, wrote an application for an NIH-funded Sickle Cell Center shortly after his arrival at UT Dallas. The application was successful and we were awarded an ~$8 million award to perform basic and clinical research on sickle cell disease. This was the stimulus for the creation of the Southwestern Sickle Cell Center which was the first in Texas and is the only such Center in the Southwest of the United States. The award runs from April 1, 2003 until March 31, 2008, and the competitive renewal application is currently in preparation. Dr. Goodman recruited Dr. Betty Pace as an Associate Professor in Molecular and Cell Biology at UTD and Associate Director of the UTD SCDRC. In 2003, Provost Hobson Wildenthal appointed Dr. Pace as Director of the UTD SCDRC.

University Of Texas At Dallas Sickle Cell Disease Research Center (UTD-SCDRC)

The UTD-SCDRC was established in January 2001 to enhance biomedical research efforts in the Dallas area related to effective treatments for sickle cell disease. Currently, Dr. Betty Pace serves as Director and Ms. Rosie Peterson as the Assistant Director of the SCDRC. Research and training activities in the SCDRC are supported by a budget comprised of federal grants, earmarked funds from federal and state resources, and private donations. Dr. Pace interacts with faculty in her home department, Molecular and Cell Biology, and with faculty in other departments including chemistry, engineering, computer science and mathematics (statistics) to establish a dynamic interdisciplinary research environment at UTD. The Center currently attracts trainees at all education levels, and in all ethnic groups, from around the world.

The mission of the UTD-SCDRC is to aggressively participate in the development of basic research to improve treatment options or to cure sickle cell disease. To achieve this mission, a three-pronged approach has been taken, including: (1) basic research related to sickle cell disease, (2) student training opportunities, and (3) community service. The SCDRC administrative staff operates from renovated office space (1500 sq ft) in the Berkner Building, in close proximity to modern laboratory space allocated to Dr. Pace.

SCDRC - I. Basic Research

Research programs in the Pace laboratory relate to globin gene regulation and genetic mutations that impact disease severity in individuals who have sickle cell disease. The Pace laboratory provides training for 13 members, mainly at the graduate and postdoctoral levels, and three senior scientists. Faculty in MCB (Stephen Levine and Steven Goodman), chemistry (Jung-Mo Ahn and Duck Joo Yang), engineering (Gil Lee) and mathematics (Pankaj Choudhary, Larry Amman) either have a primary focus on sickle cell research or are currently involved in

collaborative projects. Partners at the UT Southwestern Medical Center include Dr. Harold Garner and at UT Arlington, Dr. Robert Gatchel.

The UTD-SCDRC actively participates in activities of the Southwest Comprehensive Sickle Cell Center including the annual External Advisory Committee site visit and joint research seminars held at UT Southwestern and UTD on a quarterly basis. The SCDRC also competed for and won funding for a training supplement; Dr. Li Liu is the recipient of the award.

SCDRC - II. Training Opportunities

MIRROR Program: Our major training effort is the MIRROR (Minority Investigator Recruitment, Retention, and Opportunity for Researchers) program, which aims to increase the number of individuals from underrepresented minorities who choose biomedical research as a career path. The MIRROR program provides financial assistance through a stipend for tuition, books and living expenses. Since June of 2005, 18 awards were given for the fall and spring semesters. This diverse group consists of 7 undergraduate, 3 post-baccalaureate, 3 masters, and 4 PhD graduate students, and 1 postdoctoral fellow. Thirteen students were from underrepresented minority ethnic backgrounds. Fifteen preceptors participated from the departments of chemistry, computer science, engineering, mathematics and molecular and cell biology at UTD; faculty from the psychology and nursing departments at UT Arlington recently joined as MIRROR preceptors.

MIRROR Summer Research Program: During the summer of 2006, our first group of high school students was trained in the program. We also supported undergraduate, graduate, and medical students in the program. Students were recruited from various universities including UTD, Harvard, Ohio, Howard and UT Arlington. This program culminated with a Research Day, where over 150 trainees, faculty, staff, and family members attended and the trainees presented their work through oral and poster presentations.

The SCDRC competed successfully to become one of the participating Centers in the National Heart Lung and Blood Institute's Summer Institute Program to Increase Diversity (SIPID) in Health-Related Research. This program will expand the training activities of the SCDRC to mentoring and bench training for junior faculty around the country. Faculty at UTD and other institutions in the United States will serve as mentors and instructors for the program. The SCDRC has also developed a partnership with local Wiley College faculty to provide mentorship and training to students and faculty as part of the Upward Bound program. Wiley has had a historically Black student population.

SCDRC - III. Community Service

To achieve the third goal of the SCDRC, the Assistant Director, Ms. Peterson, interacts with the Sickle Cell Disease Association of America, on the national board and through the two local organizations in Dallas and Forth Worth. Donations were received from community organizations to support basic research in the Pace laboratory. A relationship was also established with the Aetna Insurance Corporation, which featured the SCDRC in the 2006 African American History Calendar and made a sizable contribution to the Center.

The Institute of Biomedical Sciences and Technology (IBMST)

The potential of biomedical technology, which is both far-reaching and increasingly dependent on advances and interactions among many scientific disciplines, has created a new paradigm in which teams of scientists from multiple fields come together to perform cutting-edge interdisciplinary research. Seizing the opportunities created by this new reality, the University Of Texas at Dallas in January 2003 created the Institute of Biomedical Sciences and Technology (IBMST) and appointed Dr. Steven R. Goodman as Director.

The IBMST began in 2003 with 11 faculty, all from UT-Dallas, and grew rapidly to include 116 outstanding researchers from 25 Universities and medical schools coming from 11 States within the USA. IBMST's scientists include cell and molecular biologists, chemists, physicists, mathematicians and statisticians, nanotechnologists, engineering and computer scientists, neuroscientists, neurologists, endocrinologists, pharmacologists, and hematologists, as well as scholars from several other disciplines (see www.ibmst.com). The IBMST faculty hold over $100 million of extramural funding, including several IBMST-initiated grants that have been funded over the past three years. Led by Dr. Goodman, IBMST was also successful in obtaining a FY 06 Congressional Earmark of $1.6 million funded by the DOD.

The IBMST Advisory Board includes a member of the U.S. House of Representatives, a former NASA astronaut, three Nobel laureates and other internationally recognized scientists, as well as leaders with distinguished careers in the pharmaceutical and other bioscience industries. The IBMST Board is led by Stephen Fluckiger, Chair of the Texas Life Sciences Practice of the international law firm, Jones Day.

IBMST's Vision and Mission:
The IBMST Vision is the production of novel diagnostics, treatments and cures for disease to enhance human health and quality of life. The IBMST Mission is to integrate expertise in basic and applied biosciences to advance science, medical research and the development of bioengineering and biomedical products. To accomplish this mission, we use the combined and integrated expertise of the large base of IBMST member scientists who perform major scientific and cutting-edge interdisciplinary research in areas that are important to all citizens.

IBMST Focus Areas: The four areas of IBMST's current research focus are:

1. Diseases of the Aging Brain - This group is focusing on improved treatments for diseases such as Alzheimer's and Parkinson's, and conditions such as stroke. It is also focused on human performance testing. The Focus Group is headed by Dr. Sandra Chapman and Dr. Santosh D'Mello.

2. Blood Disorders - This group is carrying out proteomic studies to understand why there is so large a diversity in clinical outcomes for patients with sickle cell disease. They are also developing better treatments and a gene therapy cure for sickle cell disease. The group is headed by Dr. Steve Goodman.

3. Molecular Diagnostics and Biomolecular Technology – This group is developing DNA

targets for new cancer diagnostics and drug screening methods. It is headed by Dr. Stephen Levene.

4. Bioengineering, Security & Defense – This group integrates research in biomaterials and nanotechnology with engineering and computer sciences to create new technologies with applications in sensing, homeland security and defense. It is headed by Dr. Rockford Draper.

As of September 2006, President David Daniel has placed IBMST under the UTD/UTSW Green Center for Systems Biology. The Oversight Committee for this Green Center is chaired by Provost Hobson Wildenthal and consists of administrators from UTD and UTSW as well as a community representative. Dr. Goodman decided to resign his Directorship effective September 16, 2006. The Committee led by Provost Wildenthal represents only two of the twenty five participating IBMST Universities and Medical Schools. It therefore is philosophically opposed to the concept of shared Institutional governance that Dr. Goodman and the IBMST Board were proposing. Moreover, Systems Biology represents an important but only a small component of the scientific breadth of IBMST.

Center for Applied Biology (CAB)

The Center for Applied Biology (CAB) was established in FY2001 and received dedicated funding from the State of Texas Legislature. Dr. Lee Bulla, a Professor in the Department of Molecular and Cell Biology, was appointed as the Director of the CAB. Dr. Bulla wrote the first solicitation for funding to UTD from the Texas Legislature. The amount of funds appropriated was $1.25 million per biennium. The amount of funds directed to the CAB by UTD was $305,652.37. Effective September, 2006, the directorship along with several CAB accounts were placed in the Office of the Provost.

Mission

The mission of the CAB is to promote and nurture cross-disciplinary and interdisciplinary research and education in biotechnology and bioinformatics, encompassing the disciplines of biology, chemistry, physics, computer sciences and mathematics. In accord with this mission and objectives, the Center has established programs to provide opportunities for interactions among scientists and engineers at UTD and their colleagues at the University of Texas Southwestern Medical Center in Dallas, the University of Texas Cancer Center in Houston, private industry, and other institutions.

Objectives

The CAB is a research and technology development center at UTD. The CAB represents a departure for UTD and pursues a strategy that combines development of biotechnology and bioinformatics platforms to generate fundamental knowledge and applications that can be exploited in medicine, agriculture and industry. A primary goal of the Center is to fit product- and process-oriented biotechnological research and development activities into an academic research environment. The Center has been organized programmatically to integrate applications in biology, chemistry, physics and computer sciences and aims to address the needs of the University to:

- conduct translational research leading to new biomedical, agricultural and industrial applications.
- foster development of biotechnology and bioinformatics in the UTD environment, the Dallas-Fort Worth area, and in the state of Texas.
- establish an environment for education, training and scientific entrepreneurship in biotechnology.

Collaborative Programs

The cross-disciplinary and interdisciplinary collaborations within the Center that are being established involve sharing of expertise among various departments and other institutions which, in turn, is leading to the development of new research opportunities, and is providing students the opportunity to expand their research skills and to learn to reach beyond the boundaries of traditional disciplines. The establishment of a network of interdisciplinary and cross-disciplinary research collaborations increases the knowledge base of CAB faculty members, enriches the

environment for Center graduate and undergraduate students and increases the contacts and resources that support the continued growth of CAB programs. These features transcend what otherwise would be extremely difficult, if not impossible, for the same faculty participants and their students and support personnel to achieve. Some of the collaborative programs conducted by the CAB include:

1. Cell surface molecules, receptor interactions and cell adhesion. All cells are equipped with various types of surface receptor molecules that accept signals from other cells, recognize molecular patterns and sense environmental conditions. Because cell surface molecules are usually linked to an intricate network of genetic and metabolic regulatory events, they provide a gateway for accessing and modulating these pathways. Thus, understanding the structure and function of these molecules, the cellular pathways to which they are linked and their involvement in diseases and disorders is important for the development of drugs, pesticides and many other biotechnological applications. CAB has discovered that cell adhesion molecules, particularly cadherins, are involved in entomopathogenicity of bacterial toxins.CAB established a collaboration with The University of Texas MD Anderson Cancer Center in Houston to conduct joint research of the potential use of bacterial toxins for the identification and exploitation of cell surface molecules in cancer cells. A list of cell membrane targets has been generated from this collaboration.

2. Cellular responses to stress, innate immune defenses and development of cellular resistance to stress. Understanding genetic and metabolic pathways that govern cellular responses when cells are challenged by biological, chemical or physical stress is fundamental to developing new strategies and novel agents for prevention, detection, diagnosis and treatment of diseases. Stress responses also are important in mechanisms involved in the development of cellular adaptation to various types of stress conditions. The CAB developed innovative approaches using proteomics analysis of model insects to test cellular stress and development of resistance at the cellular level. The CAB established collaborations with Michigan State University and Kansas State University to investigate innate immune defenses and resistance to bacterial toxins in agriculturally and medically important insects. The CAB extended its research in this area to study resistance of insects to microbial pesticides.

Technology Transfer

Biological Targets, Inc. is the first spin-off biotechnology and bioinformatics company of the CAB, specializing in rapid discovery, identification and validation of genes and proteins from unsequenced genomes and in the engineering of specific DNA molecules for the purpose of developing pesticides and therapeutic drugs. The mission of the Company is to expeditiously identify, characterize and validate molecular and cellular targets that are key to the discovery and development of safe and efficacious pesticides, drugs, anti-infectives and drug delivery agents. Dr. Lee Bulla is the company's President and CEO.

The Bionanosciences Group at UTD

In 2002-2003, Dr. Rockford Draper took an in-house sabbatical at UTD with the objective of networking the diverse scientific communities at UTD whose research overlapped in the nanoscale dimensions. This included people from the biological, chemical, physical, and engineering disciplines who formerly had no organized platform for interactions. The first meetings were in 2002 and operated on the idea that if the science were interesting enough, people would come. People came, a dedicated core faculty developed, and the interest has been sufficient to sustain weekly meetings for three years that attract 20 or more people. This collection of faculty, staff, and students, now known as the Bionanosciences Group at UTD, has collaborations with other universities nationally and internationally, and has formed partnerships with companies in the area interested in bionanotechnology. Research resulting directly from interactions developed in the group has produced highly cited papers and attracted research support in excess of $2.4 million to members of the group and affiliates off campus. The Bionanosciences Group developed a graduate course, "Bionanotechnology", that is jointly offered between the School of Natural Sciences and Mathematics and the School of Engineering and Computer Science. An undergraduate version of this course is under development in response to interest by the undergraduate community. The Bionanosciences Group also has close ties with the Institute for Biomedical Sciences and Technology (IBMST) at UTD, which connects the bionanoscience effort with the wider biotechnology and medical network of the IBMST.

The core faculty of the group (those from UTD who regularly attend the weekly meetings) include Ray Baughman (Chemistry), Gregg Dieckmann (Chemistry), Rockford Draper (Mol. Cell Biol. and Chemistry), Donovan Haines (Chemistry), Inga Musselman (Chemistry), Steve Nielson (Chemistry), and Paul Pantano (Chemistry). In addition, affiliated faculty (those from UTD that attend selected meetings and who collaborate on projects) include Jung-Mo Ahn (Chemistry), Matthew Goeckner (Engineering Computer Science), Steve Goodman (Mol. Cell Biol.), Donald Gray (Mol. Cell Biol.), Wenchuang (Walter) Hu (Engineering Computer Science), J.B. Lee (Engineering Computer Science), Steve Levene (Mol. Cell Biol.), Larry Overzet (Engineering Computer Science), Lucien Thompson (Behavior and Brain Sciences), and Anvar Zakhidov (Physics). Collaborators from private companies include Hassan Ait-Haddou (Zyvex, Richardson, TX), Gareth Hughes (Zyvex, Richardson, TX), and Nalin Kumar (UHV Technologies, Fort Worth,. TX). There are over 20 graduate and undergraduate students working on research projects of the group. In addition, there are numerous collaborators from other universities who interact with the group.

VIII. Grant Support

Extramural Support

Table VIII-1 (page VIII-2) summarizes the amounts of extramural grant awards to MCB faculty over the last five years, and the status of funding at the beginning of the FY 2007 (2006-2007) according to the most recent faculty annual reports and faculty input. The amounts listed are total costs distributed through the most appropriate fiscal years. Expenditures may have occurred in adjacent fiscal years, but this should not affect the overall funding average. UTD funds for special research projects or faculty start-up are not included.

Extramural support to the MCB faculty has doubled from $2.1 million in FY 2001 to a current high of $4.1 million in FY 2007 (Fig. VIII-1). Typically 11 of the 16 departmental faculty members at any one time have had extramural grant support, with a six-year average funding of $290,000 per funded faculty member (Table VIII-1). Current sources of research funds include the National Institutes of Health, National Science Foundation, Robert A. Welch Foundation, Texas Higher Education Coordinating Board, American Health Assistance Foundation, Biological Targets, Inc. (BTI), and a Federal Earmark grant to the IBMST Texas Consortium.

Fig. VIII-1. MCB External Funds (FY01-07)

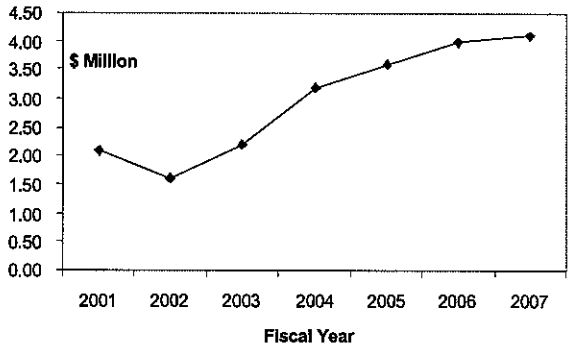


Table VIII-2 shows the relative funding to MCB for FY 2001-2005. MCB has ranked between the 2nd and 5th UTD research unit at UTD in terms of grant funding/expenditures during this period. Awards to MCB faculty were on average 11% of university awards and about 25% of awards within the School of Natural Sciences and Mathematics. In FY 2006, the percentage was 36% -- an all time high for the department. Thus, MCB grant awards have been consistently high during the past 13 years relative to the other departments in the school for the past decade.

TABLE VIII-2
MCB FUNDING RELATIVE TO NS&M SCHOOL AND UNIVERSITY FUNDING (in Millions; from President's Annual Reports, Office of Grants & contracts, Office of Development and Individual Faculty Data)

Fiscal Year	MCB	NS&M	UTD	%MCB/ UTD
2001	$2.1	$8.7	$21.7	9.7%
2002	$1.6	$9.7	$22.0	7.3%
2003	$2.2	$12.4	$28.1	7.8%
2004*	$3.2	$11.2*	$20.7*	15.5%*
2005	$3.6	$13.6	$30.2	11.9%
2006	$4.0	$11.1	$23.2	17.2%
2007#	$4.1	ND	ND	ND

Sickle Cell Center awards are included as part of MCB.
***Data for FY 2004 are for expenditures rather than awards.**
#Funds received as of October, 2006; ND = no data

Indirect Costs

The university's indirect cost rate on Federal grants is currently 50% of modified direct costs. 10% of the recovered indirect costs are returned to the individual faculty PI. Necessary repairs to the physical plant and minor renovations of space are generally funded from the department's maintenance and operations budget.

Faculty Between Grants

At present, the university does not return any portion of indirect costs directly to the MCB department, which generates the funds. Therefore, the department has no source of flexible funds to support faculty members who need start-up funds for a noteworthy project or who are productive but have lost funding support. Faculty members in the latter position may have difficulty regaining funding once they have exhausted any indirect cost money necessary to continue research. Possible relief in terms of teaching waivers, special leaves for faculty development, or funding of projects can be acquired only by application to the Dean. Such a policy leaves the MCB department helpless to provide support to its faculty.

TABLE VIII-1
EXTERNAL FUNDING OF MCB T/TT FACULTY
(Amounts awarded were divided through the most appropriate fiscal years. Fiscal year 2002 extends from 9/1/01 to 8/31/02, etc.;"NA" - not among T/TT faculty)

Faculty	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Agency
Breen					50,000	50,000	Amer Health Assistance
Bulla	36,667						USDA
Bulla	135,181						Pioneer Hi-Bred Intern'l
Bulla	250,000	250,000	83,333	83,333	83,333		TX State
Bulla			66,241	179.700	227,103	340,000	BTI (+ 3 yr)
Bulla			0	215,500	215,500	1-yr extension	NSF
Bulla			20,000	20,000	20,000	1-yr extension	NSF
Burr							
DeJong	48,333	48,333	55,333	55,333	55,333		Welch
DeJong			258,000	258,000	258,000	258,000	NIH (+ 1 yr)
DeJong	152,267						Amer Cancer
D'Mello	133,571	133,571	133,571	133,571	133,571	1-yr extension	DOD
D'Mello		258,250	258,250	258,250	258,250	1-yr extension	NIH
D'Mello				310,000	310,000	310,000	NIH (+ 2 yr)
Draper	57,750	57,750	57,750	57,750			NSF
Draper	62,000	62,000					Amer Heart
Draper				500,000			Von Ehr F.
Draper				50,000	100,000	100,000	TX state (+ 2 yr)
Draper						73,749	DARPA subcontract
González	102,929	102,929	102,929				NSF Career
González		77,550	77,550				ARP TX coord board
González		171,476	171,476	171,476	171,476		NSF
González					193,333	193,333	NSF (+ 1 yr)
González					347,000	347,000	NIH (+3 yr)
Goodman			222,000	222,000	222,000	222,000	NIH (+1 yr)
Goodman	17,633	17,633	17,633	17,633	17,633		NIH subcont
Goodman		54,202	54,202	54,202	54,202	54,202	NIH subcont

Goodman			550,000				NIH MIRROR
Goodman						1,600,000	DOD Texas Consortium
Gray	50,000	15,000					eXegenics
Gray	50,000	50,000	50,000	50,000	50,000	50,000	Welch
Hannig							
Junker			10,000	10,000	NA	NA	Amer Cancer
Levene	196,680	196,680					NIH
Levene	84,000						ARP TX coord board
Levene		225,000	225,000	225,000	225,000	1-yr extension	NIH
Miller							
Marsh						NA	
Pace	NA	325,000	325,000	325,000	325,000		NIH
Pace	NA		288,350	288,350	288,350	288,350	NIH
Pace	NA				300,000		NIH MIRROR
Reitzer	110,000	110,000					NSF
Reitzer			131,959	131,959	131,959		NSF
Spiro	NA	NA	NA	NA	NA	140,000	NSF (+ 1 yr)
Yasbin	94,789	94,789	NA	NA	NA	NA	NSF
Xia	NA	NA	NA	NA	NA	50,000	ARP TX coord board (+ 1 yr)
Xia	NA	NA	NA	NA	NA	50,000	Welch (+2 yr)
Total all faculty	**$1,581,800**	**$2,250,163**	**$3,158,577**	**$3,617,057**	**$4,037,043**	**$4,126,634**	
# funded faculty	**10**	**10**	**11**	**11**	**11**	**11**	
Avg per funded faculty	**$158,180**	**$225,016**	**$287,143**	**$328,823**	**$367,004**	**$375,149**	**6-yr Avg = $290,219**

IX. Space and Equipment

Present Space

The Molecular and Cell Biology Department occupies approximately 90% of the third floor of the Founders Building, plus temporary space on the second floor of Founders Building (FO on the campus map; http://www.utdallas.edu/campusmap.html). Offices for all the faculty, lecturers, and staff are in Founders or adjacently located in Founders Annex (FA) and the neighboring Berkner Building (BE). (The Sickle Cell Research Center Offices are in Berkner and, in addition, Dr. Pace's laboratory and a laser lab for Dr. Xia are in Berkner.) Historically, each faculty member has had 760 to 860 sq. ft. of permanent lab and office space. Temporary research space has been used as overflow to accommodate transient increases in laboratory personnel as needed. (One faculty member has been without laboratory space for the past four years.)

With the exception of undergraduate teaching laboratory space, the department functions with the faculty and students in nearly contiguous space and with access to common departmental equipment, unique equipment that faculty house within their laboratories, and numerous specialty rooms, lecture rooms that are scheduled for use by the department, and the MCB administrative offices. The space presently occupied by the department totals about 34,800 ft^2, with 17,300 ft^2 devoted to individual research lab space, and is summarized in Table IX-1.

Founders Building is over 40 years old and suffers various problems. These include inadequate heating, ventilation, and air conditioning systems and various safety issues, such as having freezers, refrigerators and other equipment in public corridor spaces that connect to other buildings. Thefts and personal safety have been important ongoing concerns in the department. During the winter and spring of 2004-2005 a fire safety sprinkler system was installed throughout the building as one phase of a required safety upgrade. Faculty labs were each shut down for about two weeks during that construction. This required considerable last-minute cooperation among the faculty, staff and students, since the construction plans were not announced to the department until late November of 2004. More recently, a web camera surveillance system was installed on the 3rd floor of Founders and has helped to discourage illegal activities.

Teaching Labs

The undergraduate "wet" teaching labs of the department all take place in one facility of about 2700 ft^2 that was constructed in 1995 in the Multipurpose Building (MP). It is located some distance from the sterilization kitchen and other facilities of the department. A separate space of 800 ft^2, shared with other NS&M classes, in Founders North is used for teaching "dry" labs for anatomy and physiology and a non-majors body systems course. There is no staff laboratory manager for the teaching labs, and the organizational work is done by Senior Lecturer Dr. Rippel.

Future Space

A final phase of upgrading Founders Building will probably begin sometime during 2007-2008. This remodeling will require a permanent move of its research laboratories, since the remodeled

space is planned to be non-laboratory space, such as offices and classrooms. Meanwhile, a new state-of-the-art Natural Sciences and Engineering Research Laboratory (NSERL) is nearing its completion in early 2007 on the northern side of the UT Dallas campus (http://www.utdallas.edu/research/news/2006/nserl-nears.html). This building, of 192,000 ft^2, will house research laboratories of faculty who have significant research funding, are engaged in interdisciplinary research, and require wet labs. Research groups from MCB, Chemistry, Physics, Electrical Engineering, Materials Science and Engineering, and Behavioral and Brain Sciences will have space in the new building. The laboratory bench space will be shared by groups in each wing of the building. Approximately one-third of NSERL's space is being reserved to help attract new faculty and researchers. Specialized facilities in the building will include a needed new vivarium. Other specialized lab spaces needed by individual faculty have yet to be determined. There will be no teaching laboratories or classrooms in NSERL and it will be closed to students who are not conducting research. Eight MCB faculty (DeJong, D'Mello, Gonzalez, Goodman, Levene, Reitzer, Spiro, and Xia) have been designated to move their labs into NSERL.

Of the current 16 tenure-track faculty members in MCB, seven or eight will not have space in NSERL. These latter faculty will move to remodeled space in Founders Annex or Berkner Building, once its present occupants are moved. (Dr. Pace may also remain in Berkner.) These faculty will generally have their laboratory space greatly reduced and it will be shared. For example, Breen, Burr, Gray, Hannig and Miller are scheduled to share a single 2120 sq. ft. research laboratory, giving each investigator about 420 ft^2 or roughly half of the standard space now occupied by each MCB research lab. Some central equipment and facilities, such as glassware cleaning and sterilization facilities, cell culture facilities, a freezer room, a darkroom, and constant temperature rooms will have to be duplicated, and details has yet to be worked out regarding funding of this plan and adequacy of these facilities. Office space for faculty, lecturers, and support personnel has also yet to be identified for those not moving to NSERL.

While a move out of Founders is inevitable and even imminent, the MCB faculty are concerned that the division of the already small MCB research faculty into two locations will seriously restrict intra-departmental group activities and sharing of equipment and expertise. In addition, the total research lab space to which the faculty will be assigned (in NSERL, Founders Annex, and Berkner) will be less (by about 20%) than the current individual research lab space (17,300 ft^2). This will further limit the number of students and research personnel that can be accommodated to be trained in laboratory techniques and to work on grant-supported projects.

A related issue is that there is no office space presently available for TAs, so TAs must meet students in one conference room in the department, or at their lab desks. These constraints will become critical once a majority of the faculty move to NSERL. It will become difficult for students to even meet with faculty who have moved to NSERL. These constraints should eventually be relieved by a newly approved $27 million education building, that could be completed by fall 2009, that will focus on research-based education in mathematics, science and engineering. In the meanwhile, plans to manage the interrelated research and teaching obligations of the department need to be addressed simultaneously.

TABLE IX-1
PRESENT MCB SPACE ALLOCATIONS
In Founders (FO), Berkner (BE), Founders North (FN), and Multipurpose (MP) buildings

Type	Space in sq. ft.
Research Labs	17,337*
Offices Faculty/Lecturer	3,082
Offices Misc Research Staff and Student	409**
Cold/Warm Rooms, Darkroom, Radioactivity Room	1,240
Sterilization/Media Kitchen	896
Specialized Equipment Confocal Microscope, Mass Spec, Centrifuges, Etc	1,637
TOTAL RESEARCH SPACE	24,601
UG Teaching Wet Lab	2,694
UG Teaching Dry Lab	819#
Grad Teaching Lab (temporary)	655
TOTAL TEACHING LAB SPACE	4,168
Classrooms/Conference Room	1,616
MCB Departmental Offices	930
Sickle Cell Research Center Offices/Administration	1,429
Mailroom/Copying/Printing	549
Departmental Shop	444
Storage	1,048
GRAND TOTAL ALL SPACE	34,785 sq ft

* Includes est 982 sq ft corridor space used for freezers, refrigerators, incubators, etc.
** Does not include student desk space in labs.
# Shared space in NS&M

Equipment in the Department

Individual research labs are generally well equipped with items commonly needed for biochemical, microbiological, molecular, and cell-biological research. Major equipment items available in the department and for graduate student research include a Leica TCS SP2 AOBS confocal microscope system, ThermoFinnigan LCQDECA XP ion trap mass spectrometer, a complete Spectra-Physics femtosecond laser system, a BioSciences fluorescence activated cell sorter (FACS), a Veeco MultiMode SPM atomic force microscope, a Perkin Elmer DNA chip reader, Molecular Dynamics PhosphoImagers, BioRad real-time polymerase chain reaction instruments, Beckman scintillation counters, three Beckman Optima ultracentrifuges, a Jasco J-715 spectropolarimeter, and mammalian cell culture facilities, eight warm and cold rooms, staffed glassware cleaning and sterilization facility, and darkroom.

With the arrival of Dr. Steven Goodman as Department Head in 2001, the university allocated a $1 million fund to purchase needed new equipment for the department. A number of the above items were purchased (Leica confocal microscope, BioSciences FACS, Perkin Elmer DNA ScanArray, two Beckman ultracentrifuges, Beckman scintillation counter), plus two Sorvall centrifuges, an autoclave, sterilization oven, BioRad real-time PCR instrument, Amersham Storm PhosphoImager, office furniture, and extended warranties on several equipment items. Since then, obtaining major new equipment items has been tied to the recruitment of new faculty.

Core Facilities and Service Center

There is no fund currently in the MCB department to pay for service contracts. In an effort to fund maintenance and replacement of important core facilities for the department, a Service Center account was set up in 2005 to provide continuing service on five departmental items of equipment (Leica confocal microscope, BioSciences FACS, Amersham Storm PhosphoImager, Perkin Elmer DNA Scanarray, and BioRad real-time PCR). The charge to grants has been $25/hour or per sample for use of a particular instrument. Cost recovery has generally been minimal, except to support the confocal microscope. Thus, only the Leica confocal microscope has been maintained on a renewed company service contract for the past year. All other instruments for which the department is responsible are off service contract and will be repaired as needed by service calls. However, the department would not be able to pay for a major failure of an instrument.

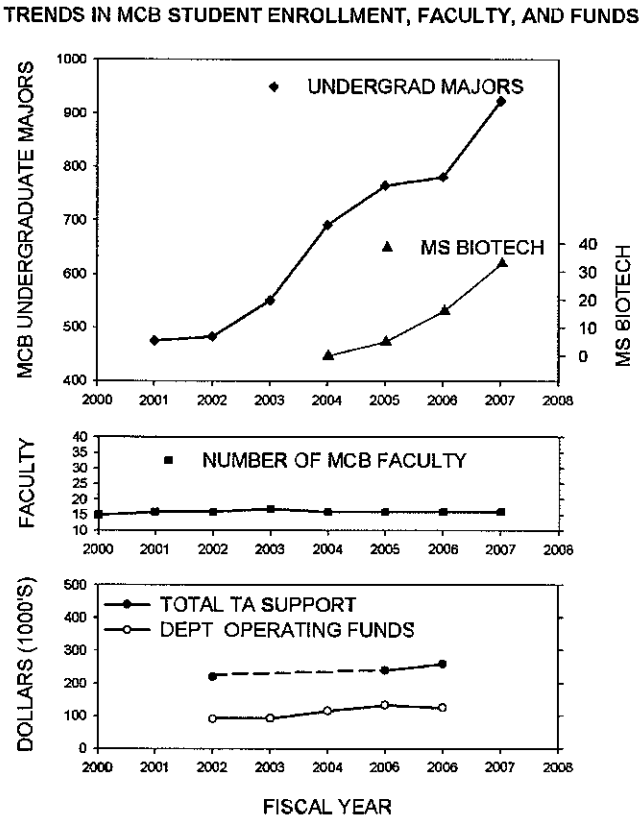
X. Action Recommendations

The MCB faculty enthusiastically support of the goals of the university and school and wish to work with the administration to reach a higher level of research status and teaching excellence. In a number of ways the upper administration has been very supportive of the department, notably in the recruitment of new research faculty and ongoing support for faculty recruitment. At the same time, there is at present a notable disjunction between the lofty missions of the university and the fiscal and space constraints under which it, and the MCB department, operates. Should these constraints be eased, the following recommendations indicate some of the major actions that would take advantage of the opportunities the MCB department offers to further the mission of the university.

1. Increase MCB departmental funding and planning flexibility

It is essential to immediately improve the environment in which the department carries out its missions of teaching and research. External factors seriously limit the support and flexibility of operations for any departmental administration, in terms of (A) insufficient funding for needed support personnel, for a departmental operations budget consistent with increased obligations, and for needed TA stipends; and (B) a lack of needed flexibility in matters of managing stipends, space, and other resources. Figure X-1 demonstrates the rapid growth in MCB student

FIGURE X-1
(TA support is absent for years in which TA support and RA support were combined; Dept operations does not include funds for UG research in FY 2006; see Table III-3)



obligations (top panel), compared with the static figures for numbers of faculty, TA stipends, and available operational funds (bottom panels). This difference is not sustainable, nor is it consistent with the mission of the university to reach Tier One status. Moreover, MCB should be included as a full partner from the outset in planning university Bio-related initiatives such as with the School of Computer Science and Engineering and with UT-Southwestern Medical School. These factors need to be addressed to assure the successful implementation of other goals outlined below.

2. Recruit an outstanding Department Head

The MCB department faces important and exciting challenges in the near future as the university tries to meet its goal of becoming a Tier One institution. To meet these challenges it is important to have active and visionary departmental leadership, and a critical action will be the recruitment of an outstanding, nationally-recognized Department Head. This person will oversee departmental operations, guide future growth, and serve as an advocate for the department in interactions with the administration.

3. Increase the number of permanent faculty to 24 by 2010

The recent Washington Advisory Group (WAG) report suggested that UT-Dallas should focus on developing the biological sciences through a larger and better funded Department of Molecular and Cellular Biology. Based on recommendations in this report, a third goal of the department is to increase the number of permanent faculty. This is not only important in order to generate a critical mass of research activity, but also because with 729 Biology + 83 Molecular Biology undergraduates (plus post-baccalaureate students) and 54 Molecular and Cell Biology + 19 Biotechnology graduate students, the department is the largest in Natural Sciences and Mathematics (47% of all NSM undergraduates), and the Biology undergraduate major is the seventh largest individual category in the university (as of Spring, 2006). Due to departures and retirements, the current number of faculty (16) is only one more than 1999 levels. Two faculty searches that could not be filled in 2005/2006 are anticipated to be filled during 2006/2007, and a continuation of two searches per year over the next several years would allow an increase to a new target baseline of 24 by the year 2010. Several of these hires could be part of a package offered to a headship candidate, and others would ideally complement existing areas of research in the department. Current searches are in the areas of cell biology and biomolecular structure. The administration could consider more creative ways to quickly add quality faculty by recruiting research teams of 2, 3, or more faculty at once.

4. Reduce teaching workloads.

The MCB faculty are detrimentally overworked. This is a consequence of numerous factors detailed in the body of this report. One is the growth in student population in the absence of commensurate faculty growth. Another is the formula for workload calculations that effectively prevents the teaching of concurrent courses. Additionally, the decline in the availability of TAs has increased the time faculty must devote to managing large courses. The immense teaching workloads are directly in opposition to the stated goal of UTD to become a Tier One research university. Research requires faculty time, especially since the scarcity of research funds has

increased the time needed to write more and more grant applications. The high workloads have contributed significantly to low morale amongst faculty and have caused reluctance to participate in departmental committees, such as recruiting committees, various educational committees, and other essential departmental jobs — there is insufficient time. The WAG report recommended that the teaching requirement for research active faculty be no more than a 2 + 1 policy (two courses one semester, one course the other semester), and in some cases less. A 2 + 1 policy would effectively amount to a reduction in the required organized course instruction by 25%, from 12 to 9 organized class TLC (teaching load credits) per academic year for research active faculty. Since the WAG report, a few research-active faculty were assigned overall 33% teaching waivers during the 2004-2005 and 2005-2006 academic years by the Dean. However, no research waivers were allowed for the 2006-2007 academic year. Overall, MCB teaching loads have increased rather than eased. The MCB faculty endorse the WAG recommendation as a maximum teaching load and also believe that a consistent policy for further reducing the teaching load of research active faculty should be developed with the input of the MCB faculty. Further, we recommend that teaching relief be given to faculty who volunteer for essential university and national service. One example where this is critical is in faculty recruitment committees. To meet goals for recruiting new faculty will require multiple search committees every semester in the near future, and these duties are very time intensive for participating committee members. We recommend that faculty who chair such committees have their teaching loads reduced.

5. Comprehensively address the current facilities and space issues

The present plan to divide the department into two widely separated buildings has created a number of problems. The critical mass of adjacent working faculty, already below any realistic expectation, will be further reduced. Expensive support functions, such as sterilization facilities and common instrumentation, will have to be duplicated. It is presently unclear how the decision to move certain faculty and not others was made. With the move expected in less than nine months, most faculty destined for either the Natural Science and Engineering Research Laboratory (NSERL) or relocation to the Berkner building still do not know exactly how much space will be available, but it is clear that almost everyone will have less space than at present.

A dialogue between the MCB faculty and the administration on alternatives to the current plan has never been held. We believe an important action is to hold this dialogue. Below are two alternatives to the present plan that would not so adversely affect MCB and the entire School of Natural Sciences and Mathematics:

a. There is sufficient space in NSERL to contain almost all of MCB. Temporarily move all of MCB into NSERL until new space becomes available. For example, a new teaching facility that has undergraduate labs is slated to open in just three years. Current undergraduate labs in Berkner will transfer to the new labs, opening significant space in Berkner for either housing new faculty or relocating selected labs from NSERL to Berkner, opening space in NSERL.

b. If moving MCB to NSERL is politically impossible, another option might be to keep the Founders Building open just three more years until 2009 when the new undergraduate labs are on-line and space is opened in Berkner by transferring current undergraduate teaching labs in

Berkner to the new teaching building. We have never been told why Founders must close by a particular deadline.

6. Begin a fund raising campaign for a new Life Sciences Building.

The present building and facilities quandary will not be solved until a new Life Sciences Building, or a multi-use Natural Sciences and Mathematics building, is constructed. The need for this has been apparent for 25 years. The last three major academic buildings constructed on the UTD campus were two engineering buildings and a management building. The NSERL, primarily another engineering building, will be the fourth. The next planned building will primarily house teaching laboratories, with no research facilities. Other universities in Texas, and the North Texas area, have successfully raised funds for new life sciences facilities over the last 10 years. Why has UTD been unable to compete for these building resources? The administration should make this their number one priority by publicly announcing a capital fund raising project for a new Life Sciences Building, or at least a new Natural Sciences and Mathematics (NS&M) Building that will house MCB as well as other NS&M components.

7. Develop and support appropriate equipment core facilities.

Much of the current major equipment in MCB was obtained as part of the negotiated recruitment package for Dr. Steven Goodman as Department Head in 2001. This equipment includes a tandem mass spectrometer, confocal microscope, cell sorter, and DNA microarray analyzer. More equipment is on the way through a grant from the Department of Defense that is arriving through the efforts of the IBMST past leadership. For the MCB and UTD research enterprise to be successful, the university needs to financially support this equipment with service contracts and trained personnel to oversee necessary core facilities. This could be appropriately supported with indirect cost recovery funds, none of which are now available to the department.

8. Develop, with the administration, a detailed five year plan for MCB.

In addition to the need for a new Head of MCB, new faculty, new space, and reduced workload, there are many other items that need to be addressed. These include operational budgets, the limited departmental staff, TA resources, the graduate programs, and the ever increasing number of undergraduate students. We believe an important action is to convene an internal task force of MCB faculty with university administrators to develop a comprehensive and detailed five year plan for MCB. UTD recently developed and published a new strategic plan for the university. It would be logical to follow this up with similar detailed plans at the departmental level. Now is an ideal time, with the recent appointment of a permanent Dean for NS&M.