2. Executive Summary

The Mission of the Molecular Biosciences (MB) department is to provide a world-class and well-rounded education and training to undergraduate and graduate students in basic biological sciences, preparing them to enter the workforce in a wide variety of highly technical occupations.

Faculty. There are thirty-four faculty in MB, four with joint appointments in the Bioinformatics program and one with a joint appointment in the Chemistry department. There are four Assistant Professors, seventeen Associate Professors and thirteen Full Professors. The average teaching load for MB faculty is one undergraduate level course per year and one graduate level course per year in addition to one-on-one training of undergraduate students, graduate students and postdoctoral associates in the laboratory. The department has a proactive and flexible policy of differential effort allocation whereby faculty teaching loads vary depending on research and service loads. This policy is working exceptionally well as it allows more active researchers to compete with faculty in departments and at institutions with substantially smaller teaching commitments by reducing their teaching loads while rewarding faculty with greater teaching interests who take on larger teaching loads. With very few exceptions, MB faculty have an outstanding record of quality of classroom teaching. Departmental average scores on student evaluations are uniformly high. Of our current faculty, five have received Kemper Awards and several have received Mortar Board, Hope, and other major awards.

Another major strength of the MB department is faculty research. Since its formation in 1998 from three former departments MB has hired a cadre of outstanding young scientists with an exemplary record of securing external funding for their research. In 2010, the department received a record $10m in research expenditures, placing MB among the top few departments in this respect at KU. MB continues to do well in spite of plunging federal funding levels.

The research interests of MB faculty are diverse. The recent hiring plan presented to the college indicated four main areas of interest in hiring new faculty: Infectious Diseases; Neurobiology; Cancer; and Genomics. All four areas are national grand challenge areas and represent considerable research strength at KU. MB faculty (Neufeld, Xu) played a significant role in attracting the National Cancer Center designation for KU. Other faculty are engaged in the National Alzheimer’s Center on campus (Gamblin, Ackley, Lundquist) and have provided senior leadership for several cross-campus initiatives EPSCoR, COBRE and KINBRE initiatives.

Undergraduate degrees. The majority of students participate in the general Biology degree program that is jointly taught by MB and the department of Ecology and Evolutionary Biology (EEB). MB specialty degrees include BA and/or BS degrees in Biochemistry, Cell Biology, Genetics, Microbiology and Neurobiology. MB faculty also contribute to the highly popular interdisciplinary Human Biology degree program and to the Teaching Biology Bachelor of Science degree. The EEB department offers additional specialized degrees in Ecology and Evolutionary Biology and Organismal Biology. The number of undergraduate student majors in the combined degrees making up the Biology Program exceeds 1,300. In addition, more than a thousand students enroll each year in several service courses that survey general biology or specific areas including Genetics, Microbiology and Biochemistry.

MB faculty offer state-of-the-art laboratory research experiences to more than fifty undergraduate students each year. Undergraduates are often included as co-authors on publications, occasionally as first or principle authors. The degrees earned by students in the biology program place them at a competitive
advantage for a host of employment opportunities as teachers and in science laboratories in hospitals, industry and academia. A large number proceed to advanced training in the health professions (medicine, dentistry, optometry, pharmacy) and in graduate programs around the country. The undergraduate degree programs were ranked as very good (Microbiology) and Exceptional (Biochemistry) in the 1998-2004 NRC rankings. We expect the Micro ranking to improve in the 2007-2012 period as the number of graduates increases and as we have added several exceptional new faculty.

**Graduate degrees.** The MB faculty offers advanced training in three basic disciplines: *Biochemistry and Biophysics*, *Microbiology* and *Molecular, Cellular and Developmental Biology*. MB faculty are also major participants in the campus-wide Neurobiology and Cancer programs and in the Bioinformatics program. All of these areas are considered national priorities. Fifty-six graduate students are currently enrolled in the MB graduate program. New students entering the MB graduate program are almost all enrolled in the PhD program and must undergo three laboratory rotations before deciding on a final dissertation project. The average time to degree is just over five years. Occasionally, students will be admitted to pursue a Masters degree or will transition to the Masters at some stage in their program. The emphasis, however, is on doctoral training.

Historically, essentially all of our graduating MA and PhD students quickly find employment in industry or academia, a result both of the demand within the field and of the recognized quality of our graduates. MB alumni can be found at all levels in academia and industry around the nation. The 1998 to 2004 rankings for MCDB MA and PhD programs were “good”, not surprising for a brand new program. Those for Microbiology were also “good” and “very good” for Biochemistry and Biophysics. Addition of several new and outstanding faculty in both of these areas together with a large increase in research productivity since those rankings were determined is highly likely to boost them in the future.

**Changes as a result of the Review Process.** The MB program review emphasized the importance of continuing development within the three focus areas that were identified as department strengths: 1) structural and functional analysis of membrane proteins; 2) functional genomics in physiology, development and disease; and 3) microbial- and immuno-pathogenesis. This we have done. The review also recommended that the department participate in the university-wide initiatives of Bioinformatics/Computational Biology, Cancer Biology and the Neurosciences. Indeed, these latter three areas have become major MB thrusts.

Other areas suggested for improvement by the MB program review were: a) increase grant submission and extramural funding; b) increase publications; c) enhance new faculty mentoring; d) implement differential effort allocation; d) decrease graduate student teaching commitment; e) implement ethics training for graduate students. Since the review, we have increased MB funding levels significantly which has translated into higher publication rates, introduced a set of metrics for new faculty mentoring, implemented an effective differential effort allocation process, introduced a new course in ethics that is taught annually and required for all incoming graduate students and reduced the time graduate students are required to teach.

**Overall Evaluation.** The majors biology program as well as the MB specialty degrees are core science degrees and will continue to cater to major national needs in developing a high-tech workforce well into the future. The addition of outstanding new faculty in key areas of national importance will ensure that MB’s image is strongly enhanced at the national and international levels and help to achieve our goal of becoming a top 20 program overall. MB is also central to development of the campus-wide *Institute of Translational Chemical Biology* initiative identified in a report commissioned by the Provost and holds the key to future successes in the drug discovery pipeline on the KU campus.
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OVERVIEW

The Department of Molecular Biosciences (MB) was formed in 1998 with the merger of the Departments of Biochemistry, Microbiology, and Physiology & Cell Biology. The Department currently includes 37 faculty, and 85 graduate students. Most of us are housed in Haworth Hall, together with the Department of Ecology and Evolutionary Biology (EEB), the only other Biology department on campus. Six faculty members have joint appointments, four in the Bioinformatics Program, and one each in the Departments of Chemistry and Psychology. The Bioinformatics Program is based on the West Campus, a 5 min bus drive from Haworth Hall, whereas the Departments of Chemistry and Psychology are located in buildings adjacent to, or near, Haworth Hall.

Our research programs are diverse, spanning computational & structural biology, biochemistry, genetics, cell & developmental biology, microbiology, and neurobiology. Despite this diversity, we are strongly united by a commitment to understand fundamental problems in biology at the molecular level. We also share a strong commitment to provide excellent teaching and training to our students, and service to the community. Our strength lies in the breadth and fundamental nature of our research. Our principal weaknesses are that we have too few faculty and/or lecturers for the number of degree programs and courses we teach, and too little lab space (at least within Haworth Hall) to add the number of faculty that we need to stimulate our research programs. Equally important, we have very little means to support faculty members who are between grants.

Our Department has competed well for extramural funding and other research awards. Over the last six years, we have averaged ~$5.6M/year in external funding, or around ~$150K/yr/faculty member. About 7% of these funds have come from state-wide NIH CoBRE and NIH K-INBRE infrastructure grants. In 2008, 20 faculty members were PIs on major research grants from the NIH (15), the American Cancer Society (1), the Arthritis Foundation (1), the Department of Defense (1), the American Heart Association (1), and the US Army Office of Research (1). Another current faculty member is the PI on an NIH pre-doctoral training grant (Program in Multidimensional Vaccinogenesis). Two faculty members hold University Distinguished Professorships, one of whom just won the Pavlovian Society's top research award, the Gantt Medal. Our faculty also includes two Alfred P. Sloan Fellows, three NSF CAREER Award winners, and one K02 Independent Scientist Award winner.

The Department offers PhD (and occasional MA) degrees in Biochemistry and Biophysics; Molecular, Cellular and Developmental Biology; and Microbiology. Graduate degrees are also offered, or will soon be offered, through university-wide programs in Genetics, Bioinformatics, and the Neurosciences. All of our students receive financial support, with a starting yearly stipend of $24,570. About 30% of this support comes in the form of graduate teaching assistantships (GTAs). The rest comes from faculty research grants (~65%) and departmental funds (~5%). More than 90% of our PhD students go on to postdoctoral work after completing their degrees.

The Department offers 16 undergraduate degrees including one through the KU Edwards Campus in Overland Park, KS, which is located about 30 miles east of the Lawrence Campus. Many of the introductory level courses that are required for these degrees are also required for degrees offered by EEB and are coordinated by the Kansas University Undergraduate Biology (KUUB) program. Total student enrollments in MB/EEB degree programs have remained steady over the past several years, with 1368 students enrolled for the Spring 2008 semester. MB and EEB faculty jointly offer introductory biology courses to an additional ~1000 non-majors/year and "service courses" in Anatomy and Physiology to another ~600 non-majors/yr. Eight of our faculty members have received prestigious Kemper Awards from the University in recognition of their outstanding achievements in teaching.

The Department has a strong record of commitment to service and public outreach. One of our faculty members serves as the Director of the KU Office for Diversity in Science Training. This office manages five NIH-supported programs that are aimed at increasing minority representation in
the life sciences. Annually, these programs provide support to more than 50 minority students and post-graduates at KU and the Haskell Indian Nations University campus. Several other MB faculty members have been nationally recognized for their service with the Kansas Citizens for Science, whose mission is to promote science education throughout the state. In addition, MB started and has played host to the annual Great Plains Infectious Disease meeting since its inception in 2002. We are also currently sponsoring a summer undergraduate research program (SURP), targeting students at other universities. Finally, MB faculty members have created student-friendly interfaces for web-based exploration of protein structure and function, and a state-of-the-art server for protein structure prediction.

All pre-tenured faculty allot their efforts according to the University-wide formula of 40% research, 40% teaching and 20% service. The normal yearly teaching load for research active faculty is one 3-credit hr undergraduate course, one-third to one-half of an upper level undergraduate or graduate level course, and year-round supervision of undergraduate and/or graduate student research projects. Post-tenure faculty may change their effort allotments, but in practice this rarely happens. Junior faculty generally do not teach during their first year of service at KU.

Official University statistics on the Department are presented in Appendix A. These include the time progression of student enrollments, faculty appointments, and student and faculty diversity.

RESEARCH

Overview

Faculty research interests range from understanding basic principles of protein structure and function to systems-level studies of development and behavior (see Appendix B for more complete faculty research descriptions). Our most basic research begins with Krzysztof Kuczera, who uses computational methods to understand the dynamics of protein folding and conformational change. Yang Zhang seeks to translate the basic rules of protein folding into computer algorithms that faithfully predict the detailed structure of any protein for which the amino acid sequence is known. Audrey Lamb and Fusao Takusagawa use structural biology and mechanistic enzymology to study protein structure/function relationships. Lamb's primary interest is in the biosynthetic enzymes of siderophore production for iron scavenging by pathogenic bacteria, while Takusagawa focuses on enzymes involved in arachidonic acid metabolism.

A number of other MB faculty seek to understand how folded proteins interact with each other and other molecules to form supramolecular assemblies with complex biological activities. Ilya Vakser and Wonpil Im tackle this problem at its most basic level, using computational methods to understand fundamental principles of protein-protein and protein-membrane interactions, respectively. John Karanicolas uses computational and experimental approaches to understand how protein structures can be altered to create novel activities. Liang Tang takes the problem of supramolecular assemblies to a higher level of complexity, using X-ray crystallography and electron cryo-microscopy to investigate virus lifecycle and prokaryotic signaling protein complexes. Similarly, Roberto De Guzman uses NMR to investigate protein-protein interactions involved in the assembly of bacterial type III secretion complexes, while Mark Richter and Peter Gegenheimer use biochemical and molecular genetic approaches to understand the intricate activities of the multi-subunit enzymes ATP synthase and RNAase P. Finally, Chris Gamblin uses biochemical and cell biological approaches to understand how and why Tau protein aggregates and its contribution to Alzheimers' and related diseases.

A large contingent of MB faculty members study protein-protein and protein-nucleic acid interactions as a means of understanding fundamental cellular processes. These studies begin with Susan Egan, who uses genetic, biochemical, and high throughput chemical screening methods to study transcriptional regulation by the AraC family of transcription factors in E. coli. David Davido studies transcription as a focal point for understanding how herpes virus switches from a latent to lytic growth cycle. Similarly, Scott Hefty studies the transcriptional basis of the biphasic developmental cycle of the important human pathogen, Chlamydia. Lisa Timmons is also interested in gene
regulation and uses the nematode C. elegans to study mechanisms of double-stranded RNA-induced gene silencing. Mizuki Azuma (who will join our Department next Fall) utilizes Zebrafish to understand the transformation mechanism of Ewing sarcoma by investigating the function of the protooncogene EWS. Yoshi Azuma studies the role of post-translational modification by SUMO in chromosome segregation and cell cycle progression. Kristi Neufeld uses cultured human cells and mouse models to investigate novel nuclear functions of the tumor suppressor protein APC in Wnt signaling, genomic instability, and cell cycle progression. Berl Oakley uses Aspergillus to study the microtubule cytoskeleton and its role in cell division, cell shape, and cell motility. Similarly, Bill Dentler studies microtubule growth and disassembly to understand the formation and motor functions of eukaryotic cilia and flagella. Finally, Edina Harsay uses yeast genetics, cell biological, and high-throughput chemical screening approaches to identify and characterize proteins that regulate protein secretion.

Other MB faculty members are interested in how cells communicate with each other and their environment. Steve Benedict uses biochemical and cell biological approaches to study the receptors and ligands that control T-cell activation, whereas Paul Kelly uses physiological and pharmacological methods to study the signal transduction events that underlie learning. Victoria Corbin studies the cell adhesion molecules that regulate the fusion of muscle precursor cells into mature muscle fibers in Drosophila. Bob Cohen also works with Drosophila and studies the role of the Rab11 GTPase and membrane trafficking in establishing cell-cell junctions between germ-line stem cells and their niche cells. Kathy Suprenant studies the role of the microtubule binding protein EMAP in the signal transduction of touch in C. elegans mechanosensory neurons. Erik Lundquist and Brian Ackely also study C. elegans neurons. Lundquist studies Rac GTPases as a focal point for understanding mechanisms of neuronal cell migration and axon guidance, while Ackley studies the role of the extracellular matrix in axon guidance and synapse formation. Matthew Buechner also works with C. elegans and studies a small set of genes that conspire to transform a single precursor cell into an extended tube that functions as the nematode's excretory canal. Robert Ward extends the problem of cell-cell communication to the study of the hormone-responsive signaling network that controls the transformation of a disc of epithelial cells into a mature Drosophila leg. Corbin, Cohen, Suprenant, Lundquist, Ackley, Buechner, and Ward, all use genetics first, then biochemical and cell biological approaches, in their studies. Jim Orr's research integrates physiological and pharmacological approaches to study the brain's control of lung and heart function. Similarly, Joe Steinmetz takes a systems level approach to identify and characterize the brain structures and neural networks that control learning in higher animals.

Superimposed on our efforts to understand key cellular processes through the study of known protein and genes is a strong effort to discover the as-yet undiscovered proteins and genes that control such processes. Stuart Macdonald spearheads these efforts, developing high-throughput, high-resolution genetic mapping techniques in Drosophila with the long-term goal of identifying and characterizing the genes (and specific DNA sequence variants) that contribute to complex traits. Similarly, Dean Stettler takes a genetic approach to investigate the association between polymorphisms of the human monoamine oxidase gene and human aggression.

Looking ahead, our goal will be to answer questions of an increasingly integrative nature. How are the supramolecular assemblies that control transcription, mitosis and other cellular processes targeted to the right subcellular sites at the right time and how are their activities coordinated with each other? How do cells aggregate and change shape to form tissues, limbs and organs, and how do these larger cellular networks come together to generate complex behaviors and fend off cancer and infection? Answers to these questions will require improvement in existing technologies and the development of new ones. Molecules and cells behave differently in networks than in isolation, and new tools—both experimental and computational—will be needed to unravel their complexities. We are pleased that the University of Kansas is supportive of an integrative approach to addressing the next generation of biological questions. New campus-wide initiatives in computational biology, the neurosciences, and cancer biology aim to bring together scientists from a wide range of disciplines and provide the intellectual power and infrastructure needed to answer our questions at a higher level of resolution and integration.
Funding

Our research is funded primarily through government grants from the NIH and NSF, and from private foundations such as the American Heart Association, the Arthritis Foundation, and the American Cancer Society. The Department's sponsored research programs climbed significantly from 1999-2003, but have held relatively steady (between $5.3 and 6.4 million/year) thereafter (Table 1). For fiscal year 2008 (FY2008), fifteen faculty members are PIs on NIH R01 grants (Azuma, Cohen, Corbin, Davido, DeGuzman, Egan, Gamblin, Lundquist, Macdonald, Neufeld, Picking, Steinmetz, Vakser, Ward, and Zhang). Two of these grants (to Macdonald and Vakser) are also resource grants and benefit the KU community through resource development. One faculty member (Picking) is the PI on an NIH pre-doctoral training grant (Program in Multidimensional Vaccinogenesis). Other major research grants for MB faculty members for FY2008 include one each from the American Cancer Society (Timmons), Department of Defense (Davido), the American Heart Association (Harsay), the Arthritis Foundation (Takusagawa) and the US Army Office of Research (Richter). A few of our faculty have received prestigious awards including two Alfred P. Sloan Research Fellowships (Zhang and Im), three NSF Career Awards (Lundquist, Zhang, and Suprenant), and an NIH K02 Independent Investigator Award (Gamblin). A complete list of sponsored research expenditures for each faculty member for each of the last years (2005-2008) is provided in Appendix C.

Table 1  Sponsored Research Expenditures

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<th>Fiscal Year</th>
<th>No. of Proj</th>
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<th>Total</th>
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<tr>
<td>1999</td>
<td>55</td>
<td>630;</td>
<td>2,666;</td>
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<td>2000</td>
<td>53</td>
<td>734;</td>
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<td>2001</td>
<td>63</td>
<td>813;</td>
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<tr>
<td>2002</td>
<td>57</td>
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<td>2003</td>
<td>59</td>
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<tr>
<td>2004</td>
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<tr>
<td>2005</td>
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<tr>
<td>2006</td>
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<td>2007</td>
<td>42</td>
<td>1,161;</td>
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<tr>
<td>2008*</td>
<td>51</td>
<td>950;</td>
<td>4,851;</td>
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*Preliminary
through the Medical School (PI, Dr. Joan Hunt), while the CoBRE Program in Protein Structure and Function (http://psf.cobre.ku.edu) and the CoBRE Center for Cancer Experimental Therapeutics (http://ccet.cobre.ku.edu) are both administered through the Department of Medicinal Chemistry. Four current MB faculty members (Buechner, Cohen, Corbin, Lundquist and Timmons) received significant funds from an NSF-EPSCoR infrastructure grant in Ecological Genomics that expired in 2006 (Appendix D). In all, thirteen MB faculty who were awarded funds from CoBRE, INBRE and EPSCoR infrastructure grants went on to compete successfully for major grants from the NIH, and/or other agencies.

The reputation and productivity of the Department has risen over the last five years. The March 2008 U.S. News and World Report ranked graduate degree programs in biological sciences at KU 30th among public institutions (n=107) and 58th overall (n=165), in a 5-way tie with the University of Alabama at Birmingham, the University of California at Santa Barbara, the University of Georgia and the University of Utah. This is a significant jump from a 44th place ranking among public institutions and 86th overall in 2003.

Assessment and Plans for Growth

Currently we have 30 full-time faculty members, 6 half-time members with joint appointments in other Programs or Departments, and one half-time member in phased-retirement. Fifteen of these faculty members are tenure-track Assistant Professors, 7 are tenured Associate Professors, and 15 are Professors. One of our Professors (Bill Picking) will be moving next Fall to Oklahoma State University, where he will serve as Chair of the Department of Microbiology. As described above, our research interests are diverse, ranging from protein folding and protein-structure prediction, to complex regulatory networks that control brain function and immunity to cancer and other diseases. While we believe this breadth is one our major assets, maintaining such diverse research programs with our current number of faculty makes it difficult to build a critical mass of expertise in any particular area. Indeed, some of our faculty members feel that their research programs suffer from an absence of colleagues working in the same or similar areas.

Traditionally, we have been guided in our hiring decisions by the desire to maintain balance between the three research areas—Biochemistry & Biophysics, Molecular, Cell & Developmental Biology, and Microbiology—represented by MB’s founding Departments (the former Departments of Biochemistry, Physiology & Cell Biology, and Microbiology). This desire stemmed from a feeling amongst the faculty that all three research areas were strong and worthy of continued support. Maintaining the balance between the three research areas was also the simplest way to ensure that we had the needed expertise to teach the broad range of courses that comprise our undergraduate degree programs. In 2007, the three research groups each proposed a set of specific faculty hires in a document called Strategic Plan for Hiring New Faculty (Appendix E). Department-wide review of the document and discussions regarding teaching needs led to the identification of two high priority positions, one in chemical biology/enzymology and another in microbiology/bacterial pathogenesis. Last year we received one position from the college and decided to search for a chemical biologist/enzymologist, but were unsuccessful. This year we were again given one position, and after much discussion we elected to target a protein biochemist.

Since the founding of the MB Department, many of us have come to realize that the research questions we ask and the approaches we take to answer them do not neatly match up with our former Department affiliations and/or classical definitions of Biochemistry, Cell Biology and Microbiology. In recognition of the blurred lines between these research areas, we rewrote our departmental bylaws last year to formally uncouple our three founding research areas from our administrative structure (Appendix F). We are also now in a position to uncouple our hiring practices from our teaching needs, as the Dean has very recently stated that non-tenure track lecturers may be hired in the future to maintain our degree programs, if needed. Indeed this promise was an important discussion point in this year’s decision to hire a protein biochemist rather than a pathogenesis person. With these cultural changes in place, the Department is in a position to make hiring decisions solely based on what will have the most positive impact on the quality and growth of its research programs.
In addition to the positions we are likely to receive based on our own research needs and vision, we may also receive new positions through university-wide initiatives in Bioinformatics/Computational Biology, Cancer Biology, and the Neurosciences. Fortunately, most if not all of our current and likely future research activities fit nicely within one or more of these three umbrella programs.

Our long-term goal is to increase the overall quality of our research through acquisition of more grant dollars; publication in higher profile journals; and better representation at national meetings, on grant review panels, and on journal editorial boards. A comprehensive Strategic Plan for achieving these goals was written and approved by the Department in the Fall of 2006, and subsequently submitted to the Dean (Appendix G). This plan called for across the board increases in personnel—faculty, staff and lecturers; upgrades in building facilities; and reduction in teaching loads for research-active faculty.

QUESTIONS FOR THE REVIEW COMMITTEE:
1) Should we continue to build breadth in our science, or should we focus on one or a few areas of research and, if so, which areas?
2) What is the ideal number of non-tenure track lecturers for a Department of our size?
3) What can the Department do to benefit best from the university-wide initiatives in Bioinformatics/Computational Biology, Cancer Biology, and the Neurosciences?

GRADUATE STUDIES

Degrees and Enrollments

The Department oversees graduate programs in Biochemistry & Biophysics, Microbiology, and Molecular, Cellular & Developmental Biology (MCDB). All three programs grant both PhD and MA degrees, although students are generally admitted only into a PhD program. For the current year we accepted 2 students into our MA program and 22 into our PhD program. Detailed requirements of all degree programs are provided on the MB departmental website (www.molecularbiosciences.ku.edu/) and in Appendix H.

Based on records from 2000 to 2008, an average of 110 students apply for admission into the Department each year, and ~30 of these are accepted (Table 2). Typically, ~15 students ultimately enroll per year, although the Fall 2008 cohort was much larger, with 24 students. At present there are 85 graduate students in the Department, 47% of whom are female, 6% minority students, and 47% international students.

Table 2 – Graduate student enrollment and degrees granted.

<table>
<thead>
<tr>
<th>Year</th>
<th>Students accepted</th>
<th>Students enrolled</th>
<th>Masters conferred</th>
<th>Ph.Ds conferred</th>
<th>Still enroll</th>
</tr>
</thead>
<tbody>
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<td>2000</td>
<td>44</td>
<td>14</td>
<td>5</td>
<td>4</td>
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<td>2001</td>
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<td>1</td>
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<tr>
<td>2003</td>
<td>28</td>
<td>16</td>
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</tr>
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<td>2008</td>
<td>43</td>
<td>24</td>
<td>NA</td>
<td>NA</td>
<td>24</td>
</tr>
</tbody>
</table>

Graduate Student Recruitment
A long-term goal of the Department is to recruit more highly qualified domestic students to support our research and undergraduate teaching missions, and to make us competitive for training grants. To reach this goal we take several approaches:

(1) We created a "Road Show" to increase the awareness of our graduate program. Since 2004 we have sent out 19 teams, composed of one or two faculty and a graduate student, to give seminars to biology students at undergraduate institutions. The Road Show seminar highlights career options for PhDs in molecular biology, graduate student life, our graduate program, and the research undertaken by members of the Department. These trips have mostly, but not exclusively, targeted regional undergraduate colleges and universities where students do not have access to active research programs. Three students have applied to Department as a result of these visits, but none have yet joined.

(2) We provide funds for two faculty members per year to travel and give a research seminars at out-of-state institutions. Last year Kristi Neufeld traveled to Puerto Rico and Susan Egan traveled to Baylor. Two of the graduate students who joined the Department this year were from Baylor.

(3) We invite US-based students to recruiting weekends held on campus during the Spring semester. These weekends give our potential students the chance to learn more about our program, our faculty, the current graduate students, the KU campus, and the community.

(4) We have increased our stipends to be competitive with those of our peer institutions. Currently, our stipend is $24,570 over 12 months, which compares very favorably to stipends offered by similar programs at other Big 12 schools, e.g., University of Missouri, Columbia ($21,733), the University of Colorado, Boulder ($24,282), and the University of Texas, Austin ($24,000). While we do not want our students to come to KU simply because of the stipend levels, we do not want to lose students because of inadequate funding, either.

(5) All first year students carry out eight-week rotations in three research labs prior to choosing their research mentors. Students choose their rotations based on a day-long Fall symposium, in which current students and faculty present their work, and on a series of faculty talks presented to the first year students during early Fall (Appendix I; and see below).

(6) The Department sets aside money to support up to four GRA positions per year. These positions are awarded competitively to our best incoming students who would otherwise teach during their first year. The idea was that these non-teaching positions more favorably compete with offers these students were getting from other schools. Ironically, an informal poll of some of these students suggested that, in general, the Graduate Research Assistant (GRA) vs. Graduate Teaching Assistant (GTA) offer did not influence their decision to come to KU, and that those students on GRAs in their first year felt isolated from their classmates who were teaching. We are currently considering alternative uses for these funds (see below).

(7) The Department recently overhauled its first year graduate curriculum (see below) so that all students take the same courses their first semester. These courses help to develop camaraderie between students and to ensure that all students have a wide knowledge base across the molecular biosciences before they advance to more rigorous and specialized course work.

While the steps outlined above appear to have helped our recruiting efforts, the best recruiting tool would be to have a better national reputation and the ability to show our potential students that our program will best help them to achieve their professional goals. The more successful our current and former students are, the more likely we are to recruit highly qualified and motivated applicants. As stated elsewhere, one serious impediment to the research productivity of our current students, and therefore our program, is their need to teach often to support themselves in the program.

Graduate Curriculum
Students who enter our program come from dissimilar backgrounds. To give our students the intellectual footing to be creative, productive students in our labs, we require that all incoming students take two general background courses (BIOL807 and BIOL808), and a research methods course (BIOL818). These courses provide a background that spans the entire expertise of our faculty and prepares the students to enter any of the Department’s graduate degree programs.

Halfway through the Fall semester, first year students begin a series of three 8-week rotations through MB faculty labs. The rotations provide students with first-hand exposure to a broad range of research, and help them choose a research advisor. Most students pick advisors after the third rotation, in the late Spring, although one or two students may rotate in a fourth lab over the Summer. Once students have picked their research advisor, each student selects an oral exam/dissertation committee, consisting of five or six faculty members who guide the student’s progress through the program. All graduate student advisory committees include one outside member who serves as a representative of the Graduate school to ensure adherence to all relevant guidelines.

Together with their advisor and oral exam/dissertation committee, second-year students develop a coursework plan for subsequent years of graduate study. Typically the plan entails five additional courses for Biochemistry and Biophysics students, four for Microbiology, and three for MCDB. The Department’s Graduate Student Guide spells out the requirements for each degree (Appendix J). In addition, each student takes a grant writing course (BIOL925) in which he/she writes a mock research proposal on a topic distinct from his/her Ph.D research. The proposal topic must be approved by the dissertation/oral exam committee with the research advisor present. During the following Summer each student takes a comprehensive oral qualifying examination. In the exam, the student defense of the experiments and ideas of the proposal and is tested on his/her general knowledge in biology (based largely on the classes the student has taken). The oral exam is administered by the student’s dissertation committee plus the research advisor. It is possible for students to pass the oral exam with honors, although in practice this occurs rarely. Students who fail the qualifying exam may retake it, and if they fail to pass once more may complete their research to receive a terminal Masters degree. In the last 5 years, only one student has failed the qualifying exam on two occasions. Recently a rubric was approved to assess each student’s performance on the oral qualifying exam, and this rubric will be used yearly to assess the progress of our students (see Appendix K).

After passing the qualifying exam, students are expected to focus on their dissertation research, to present their research annually at local, regional, national and international conferences, and to publish their findings. In addition all students – including first-year students – are required to attend our two weekly seminar series: the Departmental Seminar series, which brings in an array of outstanding faculty speakers, and the Student Seminar series, in which our students give yearly updates on their dissertation research. Ultimately, to obtain their Ph.D, students write a dissertation, present a public seminar, and orally defend their dissertation to their committee. During the last 10 years the average time to degree has been 6.5 years (Table 2).

Graduate Student Assessment, Rewards, and Outcomes

Each student meets with his/her graduate advisory committee on a yearly basis to assess progress and offer advice and guidance when needed. The committee reports back to the Graduate Director to provide a regular check on a student’s performance. In addition, each student must fill out an annual performance report that tallies his/her presentations, publications, and other accomplishments (Appendix L).

Students in good academic standing are eligible for 11 different Graduate Awards ($500-1,000 each) that are awarded annually (Appendix M). These awards help send graduate students to meetings, research classes or labs, or simply reward their success.

We survey students upon completion of their degrees. Students are asked to comment on the coursework, research, mentoring, and other topics pertinent to their graduate experience within the Department. They are also asked where they will be going next. Over the past 10 years, ~90% of our PhD students have gone on the post-doctoral positions following completion of their degree
requirements. The rest have either entered industry, or chosen to pursue other career directions. Six of our graduates from the last 10 years hold faculty positions, and 3 more hold directorships or staff scientist positions in the biotech industry and/or at Universities and Hospitals (see Appendix N for a complete list of the positions taken by are former students).

Student Funding Sources

Graduate student stipends, tuition and other fees are paid from a variety of sources. About 45 (of the 85 total) students per year are supported as GRAs. Nearly 90% of the funds for these positions come from NIH and NSF grants and/or start-up packages awarded to individual faculty members. The remaining funds come from inter-departmental training grants (see below) and from the Department, which uses its entire yearly allotment (~$53K/year) from the University's General Research Fund (GRF) and a portion of its overhead account (pp.16) for student support. The faculty are currently engaged in discussions to determine whether in the future they should use all, or part, of these funds for other purposes, e.g., to support investigators between grants, equipment repair and/or purchases, etc. Another ~35 students are supported each year through GTA positions provided by the College. While invaluable to our Department, the GTA positions carry a demanding teaching load of 20 hr/week. For a typical lab course, this load translates into preparing and running three 3-hr lab sections per week, with additional time devoted to grading quizzes and exams, and one-on-one consultation with students seeking extra help. Most (29.5) of the GTA positions come to the Department directly from the College. The remaining ones come from the Bioinformatics Program, who have not yet implemented enough courses to use their allotment. The Department only receives ~5 GTA positions during the summer months, so most of our students are paid by grant, start-up, and/or departmental funds during those months.

Only one MB student has ever been supported by NSF, Howard Hughes, or other National Scholarships. However, three students have been supported by Madison and Lila Self Graduate Fellowships, which provide 4 years of support to outstanding graduate students in science and engineering departments at KU. We have also had a number of international fellows, including one current Fulbright student and one Ford Foundation fellow.

Interdisciplinary Training Grants

The Department has students and faculty involved with several interdisciplinary training initiatives. From 2003 to 2008, ~2 MB students each year were supported from the NIH training grant Dynamic Aspects in Chemical Biology (PI Paul Hanson, Department of Chemistry), a grant that involves several faculty from MB and the Departments of Chemistry and Medicinal Chemistry. Two other MB students have been supported by the NIH training grant Pharmaceutical Aspects of Biotechnology Training (PI Russell Middaugh, Department of Pharmaceutical Chemistry). Finally, The Graduate Training Program in Multidimensional Vaccinogenesis, a collaboration between several departments at the KU main campus and the KU School of Medicine in Kansas City was funded by the NIH in 2007 (PI Bill Picking). Only two graduate student positions are available on the grant in this first year. More will become available in years three to five and mentorship positions will be expanded at that point to include additional faculty. In addition to these training grants, several MB faculty members are participants on a training grant awarded to the KU Medical Center Technologies in Molecular Medicine. This is a new training program that was only recently awarded by the NIH and is directed by Dr. Sam Enna at KUMC and Dr. Jane Aldrich at the KU Lawrence campus, Department of Medicinal Chemistry. It has not yet provided support to any MB students. An NIH training grant in Genetics and Genomics (PI, Robert Cohen), involving faculty from both MB and EEB, was unsuccessful and is currently being revised.

Graduate Student Symposium

Each year, the second year graduate students host a day-long Fall Symposium in which current students present their research in poster and oral sessions, faculty chosen by the students present their research in short seminars, and a keynote address is given by an outside speaker. The program from the 2008 Graduate Student Fall Symposium is provided in Appendix I. The Symposium provides an overview of the Department for the first year students and concludes with a picnic for all faculty, students and staff from MB. Additional departmental functions that bring the faculty and
students together include the Spring picnic, and the regular departmental and graduate student seminar series. The final regular seminar of the Spring semester is combined with the graduate student awards ceremony (see above).

QUESTIONS FOR THE REVIEW COMMITTEE
4) How many students should we have in our graduate program and what mix of Masters and Ph.D students should we have?
5) What teaching loads should be expected of our students?

UNDERGRADUATE STUDIES

Degrees and Enrollments

Student enrollments in biology degree programs have stood at ~1400 students per semester for each of the past 10 years, with a low of 1354 students in Fall 1999 and a high of 1484 students in 2003. Enrollment for the Fall 2007 semester was 1368. These students are spread out over 16 different degree programs (Table 3). MB’s contribution to these degree programs vary from a low of 15 credit hr for the BA in Human Biology (Speech-Language-Hearing) to more than 40 credit hours for the BS degrees in Microbiology, Biochemistry, and Biology (Neurobiology). MB also offers three service courses—in Anatomy, Physiology and Microbiology—to ~600 pre-nursing, pre-physical therapy, and Sports Science students each year. Another ~1000 non-biology majors enroll in Biol100 (introductory Biology) each year, although this course has been taught exclusively by EEB faculty in recent years. In all, MB faculty offers about 27 different lecture and lab courses, and another 5-6 seminar courses, to undergraduate students each semester (see Appendix O for course requirements for each degree).

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>students enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA &amp; BS, Biochemistry</td>
<td>150</td>
</tr>
<tr>
<td>BA &amp; BS, Microbiology</td>
<td>110</td>
</tr>
<tr>
<td>BA, Human Biology</td>
<td></td>
</tr>
<tr>
<td>Anthropology</td>
<td>7</td>
</tr>
<tr>
<td>Applied Behavioral Science</td>
<td>5</td>
</tr>
<tr>
<td>Biology</td>
<td>80</td>
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<tr>
<td>Geography</td>
<td>28</td>
</tr>
<tr>
<td>Speech-Language-Hearing</td>
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</tr>
<tr>
<td>undeclared</td>
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</tr>
<tr>
<td>BGS, Human Biology</td>
<td>55</td>
</tr>
<tr>
<td>BA, Biology</td>
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</tr>
<tr>
<td>BS, Biology</td>
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<tr>
<td>Ecology &amp; Evol. Biology</td>
<td>66</td>
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<tr>
<td>Cellular Biology</td>
<td>75</td>
</tr>
<tr>
<td>Genetics</td>
<td>94</td>
</tr>
<tr>
<td>Neurobiology*</td>
<td>23</td>
</tr>
<tr>
<td>Organismal Biology</td>
<td>77</td>
</tr>
<tr>
<td>undeclared</td>
<td>84</td>
</tr>
<tr>
<td>Molecular Biosciences (Edwards only)</td>
<td>47</td>
</tr>
</tbody>
</table>

Table 3. Degree programs and students enrollments

Program Staffing

At KU, all biology degree programs are coordinated by the KU Undergraduate Biology Program (KUUB), while the instruction itself is shared between MB and the Department of Ecology & Evolutionary Biology (EEB). It is notable however that the only course routinely taught by members of
both Departments is Principles of Genetics (BIOL350). The role of KUUB is to administer the
degrees, ensure that information concerning the course offerings and degree requirements is
appropriately disseminated, and ensure through consultation with the departmental chairs that the
courses are sufficiently staffed with faculty, instructors and teaching assistants. The relationship
between KUUB, MB, and EEB is presented in the organizational chart in Appendix P. As a separate
unit dealing with undergraduate biology teaching, KUUB offers MB the benefit of a reduced
administrative burden. A slight disadvantage is the loss of direct control over our undergraduate
teaching mission.

All MB faculty contribute to the undergraduate teaching mission of the University. Normal
teaching responsibilities include one 3-credit hour undergraduate course and one-third to one-half of
an upper level undergraduate or graduate course each year. Exceptions are made for faculty in their
first year at KU, when no teaching is expected, and for faculty with administrative responsibilities. For
particularly demanding courses (e.g., lecture classes with over 100 enrolled students, classes with
discussion sections in addition to the lectures, or lab classes) GTAs are assigned to ensure courses run smoothly. Historically, our courses are taught by tenured or tenure-track faculty members.
However, on occasion we find it necessary to use lecturers to cover our courses and avoid burdening
faculty with increased teaching loads. Considering just Spring and Fall 2008, nine credit hours were
taught by lecturers that would otherwise have been instructed by MB faculty. The high quality of
instruction provided by these professional lecturers has enhanced our teaching mission and we would
like to expand their role to ease the teaching burden of research-active faculty. The Dean’s office has
made it clear that we can continue, and if necessary extend, the role of non-tenure track lecturers to
ensure that our undergraduate course offerings are maintained both in terms of their quantity and
breadth. Two added benefits to this model are that: 1) our hiring of research faculty need not be
constrained by the need to maintain a broad undergraduate teaching portfolio, and 2) periodic relief
from teaching may be given to faculty who are up for promotion or otherwise in need of an intensive
research period.

On the other hand, the College expects some of our tenure-track faculty to teach general
biology courses—not degree specific courses—at the Edwards campus. Understandably, the
College wants the degree programs at the satellite campus to be of the same high caliber as the
degree programs on the main campus. However, traveling to and from the Edwards campus is a
major time commitment to our faculty, most of whom live in Lawrence.

In addition to our formal lab- or lecture-based teaching, faculty in MB play a major role in
mentoring students within our research labs. For the Fall 2008 semester there were 33
undergraduate students are working on Independent Study (BIOL424) projects. This number
seriously underestimates the number of undergraduate students participating in research projects as
the students do not usually sign up for credit each semester. Many of these undergraduates are part
of the KU or KUUB honors programs, which stress the value of original scientific research as part of a
student’s professional preparation. We have also just initiated the Summer Undergraduate Research
Program targeted at students from any institution who are seriously considering moving on to
graduate school. The program supports students (room, board & stipend) for eight weeks as they
gain research experience with a faculty mentor.

Numerous faculty have received well-deserved honors for their outstanding efforts in
teaching. These have included the prestigious William T. Kemper Award (Eight winners: Benedict,
Buechener, Corbin, Kuzcera, Neufeld, Orr, Picking, and Richter), the Mortar Board Outstanding
Educator Award (Corbin), the Center for Teaching Excellence Outstanding Educator Award, the
Chancellor’s Club Career Award, and others.

**Measures of Teaching Effectiveness and Student Goals**

To ensure our students are provided with proper training, we strive to assess student learning
and instructor performance in all courses at both the undergraduate and graduate level. Mechanisms
for assessment fall into three categories:
Student course evaluations: At the end of each course every semester all students are asked to rate, using a common set of criteria, both the course and the instructor on a 1 (poor) to 5 (excellent) scale, and are also free to provide written comments. A copy of the standard course evaluation form is provided in Appendix Q. Ultimately, faculty receive two scores for each course taught (one for the course and one for the instructor), and receive any written comments verbatim. Student evaluations help instructors improve course content and style each semester. In addition, annual departmental faculty evaluations and promotion decisions consider student evaluations as part of teaching performance.

Peer evaluation: Faculty at the Assistant Professor level are evaluated each year by their mentor, while other faculty are only subject to peer review when being considered for promotion. Peer review consists of the reviewer attending at least one of the reviewee's lectures, and providing an evaluation directly to the Chair to be placed on file. Typically, peer evaluation letters focus on the clarity and organization of the lecture, as well as the style of the delivery, and the attentiveness and focus of the student audience.

KUUB surveys: As part of the graduation process, KUUB surveys graduating seniors to assess any perceived strengths and weaknesses of the biology degree programs (see Appendix R for a copy of the Exit Survey form). This information can be used to suggest long-term alterations to the undergraduate biology curriculum.

**QUESTION FOR THE REVIEW COMMITTEE**

6) Do we have a reasonable number of undergraduate degree programs for the numbers of students and faculty that we have?

**SERVICE AND OUTREACH**

Professional Service

During the last five years, 12 MB faculty (Benedict, Corbin, Egan, Gamblin, Lundquist, Macdonald, Oakley, Orr, Picking, Steinmetz, Takusagawa, and Zhang) have served on NIH and/or NSF study sections, two (Cohen and Corbin) on Ireland Science Foundation study sections, and one (Benedict) on the FDA science advisory board. Most other faculty have served as ad hoc grant reviewers for NSF, NIH, the Welcome Trust, and/or other granting agencies. Six MB faculty (Benedict, Egan, Oakley, Steinmetz, Suprenant, and Zhang) are currently members of or have recently served on journal editorial boards. During the last two years more than 30 MB faculty reviewed research papers for leading professional journals, including *Cell, Nature* and *Science*. MB faculty have also been involved in: reviewing the promotion and tenure files for other universities (e.g., Tufts University, University of Wisconsin Medical School, Milwaukee; University of Missouri; University of Oklahoma; University of Colorado School of Medicine; and University of Wisconsin); reviewing research departments of other universities (University of South Carolina); organizing professional meetings and workshops (e.g., The Great Plains Infectious Disease Meeting; Workshop on Hormonal regulation of development at the Annual Drosophila conferences; and The C. elegans Neuronal Development, Synaptic Function, and Behavior Topic Meeting). One faculty member is the primary author of a very popular biology textbook (Robert Weaver; Molecular Biology, McGraw-Hill), while another has written a popular book regarding the spread of germs (John Brown; Don't Touch That Doorknob! How Germs Can Zap You and How You Can Zap Back, Warner Books).

University Service

MB faculty regularly serve on various standing committees at the College and University levels, including the Sabbatical Leaves Committee, the College Committee on Promotions and Tenure; Faculty and University Senate Committees, and the Institutional Animal Care and Use Committee. MB faculty are also well-represented in University administrative units, including Joe Steinmetz, the Dean of the College of Liberal Arts and Science (CLAS), and Robert Weaver, the Associate Dean of the Natural Sciences, within CLAS. MB faculty have also served on numerous university-wide task forces, including one for the new neurosciences initiative. One MB faculty member (Jim Orr) is an Honors Program Fellow.
Outreach Activities

MB has played an integral role providing research opportunities to undergraduate students, with special emphasis on minority students. Jim Orr has served as the director of the KU office for Diversity in Science Training for several years. This office manages 5 NIH-funded programs designed to increase the involvement of minority students in science education and research. The programs include: 1) the Initiative for Maximizing Student Diversity (IMSD), which provides mentored research opportunities for minority students during their undergraduate studies; 2) the Post-Baccalaureate Research Education Program (PREP), which provides mentored research experiences to recent BA/BS graduates as a stepping stone for their entry into graduate research programs in science-related fields; 3) the 500 Nations Bridge Program, which provides research opportunities to Haskell Indian University students to facilitate their transition to KU or other universities that offer degree programs in the biomedical sciences; 4) the Research Initiative for Scientific Enhancement (RISE), which provides research experience for Haskell faculty members; and 5) the IRACDA, which provides research support to minority post-doctoral fellows in preparation for research and teaching careers in academia. Starting last year, Yoshisaki Azuma has headed a Summer Undergraduate Research Program (SURP)—co-funded by the Department and CLAS—that provides mentored-research opportunities for up to 10 undergraduates.

MB faculty members have also played prominent roles in the promotion of science education throughout the state of Kansas. Matthew Buechner and Peter Gegenheimer both serve on the board of directors of the scientist-organized Kansas Citizens For Science (KCFS). KCFS was instrumental in challenging the 1999 Kansas State Board of Education’s decision to adopt state science standards that removed key aspects of the theory of evolution as well as other critical concepts in earth science and cosmology. More recently, the KCFS have successfully resisted efforts to insert Intelligent Design-influenced changes into the state’s Science Standards. Buechner’s work with KCFS been featured in many national media outlets, including the journal Nature, PBS and National Public Radio.

MB outreach activities also include the development of web-based educational tools. Jack Brown has long maintained a website that informs, in simple terms, the public about current infectious disease outbreaks and what they can do to prevent their spread. Finally, Yang Zhang and Wonpil Im are developing student-friendly interfaces for web-based exploration of protein structure and function, and a state-of-the-art server for protein structure prediction.

DEPARTMENTAL GOVERNANCE

The Department is chaired by an individual who serves a five-year term. Bob Cohen is currently our Acting Chair. The term is renewable following the presentation of a departmental evaluation to the CLAS Committee on the Evaluation of Chairs and Directors, who then makes a recommendation to the Dean. Details on the election of the Chair are spelled out in the Bylaws of the Department of Molecular Biosciences” (Appendix F). The Chair may select an Associate Chair, a position currently held by Susan Egan. In addition to being an advisor to the Chair, the Associate Chair is responsible for substituting for the Chair in official duties as required, and works with the Chair to oversee faculty promotion and tenure matters, progress toward tenure review and the annual faculty evaluations. Two other important departmental positions are the Director of Graduate Studies (Steve Benedict) who oversieves all aspects of our graduate program, and the department’s Undergraduate Biology Coordinator (Matthew Buechner) who helps develop and coordinate faculty members teaching assignments.

There are multiple standing departmental committees, and these are outlined in the bylaws (Appendix F). These committees present recommendations to the entire department during monthly faculty meetings. Following discussion, if a vote is called for on a particular issue, most decisions are made by simple majority vote. The one exception is for faculty hiring decisions, when a two-thirds majority of a quorum is required. Notably, Assistant Professors are excluded from all decisions regarding promotion (to both Associate and Full Professor), and Associate Professors are excluded from Associate to Full Professor promotion decisions.
FACULTY YEARLY EVALUATION AND PROMOTION

Faculty performance is evaluated yearly by an elected committee that includes the Department Chair. For the evaluation, the faculty submit an updated copy of their CV and complete an evaluation form (Appendix S) that solicits information about research, teaching and service activities for the year. There is also room for the faculty member to comment about his or her performance. The committee then reviews each faculty member and generates a ranking that is used for determination of merit raises. While the committee strives for fairness, the ranking process is inherently subjective and has been a source of angst for many of our faculty.

Junior faculty undergo a mandatory pre-tenure review in the Fall semester of their third year. The faculty member fills out a ‘blue report’ that details their accomplishments to date in research, teaching and service. No external letters are solicited for the review, but the Departmental P&T committee and Chair provide letters of evaluation. The entire dossier is sent to the College P&T committee, which provides feedback to the faculty member with respect to his or her progress towards tenure. Consideration for promotion to Associate Professor with Tenure occurs in the Fall semester of the fifth year, although faculty members may nominate themselves earlier if they wish. The tenure process may also be delayed (e.g., for the birth of a child) for one year by request of the candidate. The candidate fills out the same blue report as before, but this time external letters of evaluation are included. The dossier is reviewed and voted on, in succession, by the Department, the College P&T committee, and the University P&T committee. However, the final decision to promote or not is made by the Chancellor. Since the Department’s formation 10 years ago, 11 faculty have gone up for promotion to Associate Professor with tenure. Of these, two were denied, and two others withdrew their candidacy after a negative vote at the Departmental level. While the College does not report official tenure rates, many of us feel that our rate of negative tenure decisions is significantly higher than that of most other Departments within the College. It is, however, noteworthy that each of our last six candidates has been awarded tenure.

FACILITIES AND INSTITUTIONAL SUPPORT

Administrative Support
MB has four full-time administrative associates who provide support within the department: John Connolly coordinates our graduate program, Sharon Moritz and Pam Sanchez manage payroll issues, purchases using State money provided by the College (primarily startup awards), and other departmental accounts, and Linda Wiley is the assistant to the chairperson and deals with all other clerical and administrative issues involved in the general operation of the department (see Appendix P).

Buildings and Space
Most of our faculty (30 research labs) are housed in Haworth Hall, a dual research/teaching building that was erected in the 1960s and added onto in 1985. Haworth also holds the MB and EEB departmental offices, offices for KUUB personnel, labs for around 20 of the EEB faculty, several lecture halls (including one midsize hall with seating for 180) and teaching lab spaces, as well as common space for shared equipment and facilities. As is typical with buildings of this age, Haworth does no more than meet the minimum requirements for modern research, having erratic electrical, HVAC, steam, and water systems. Four of our faculty – those with joint appointments in the Center for Bioinformatics - are housed in the 2006 Multidisciplinary Research Building (MRB) on West Campus, with one (John Karanicolas) having space both in MRB and Haworth. Finally, Krzysztof Kuczera, who holds a joint appointment in Chemistry, has space in Malott Hall. Typically, research and office space for each faculty member is around 1,000 sq. ft., but if available and necessary, additional space can be allocated by the Chair. We currently have three lab spaces available, including Bill Picking’s who will be leaving next Fall. One of the available labs will be used for the Protein Biochemist upon completion this year’s search. Another is being held for Mizuki Azuma, whom we recruited last year as a direct hire. The third lab space (on the fifth floor of Haworth) is currently being used as a common equipment room. Ideally, we will keep this room dedicated to
housing common equipment as no other such space currently exists on this floor. While we do not have any other space currently available for new faculty hires, two faculty members have said they are willing to move to smaller labs/offices should their space be needed.

**Shared Equipment, Facilities and Support**

Haworth Hall is equipped with the typical common equipment required for molecular biology research, including autoclaves, ice machines, controlled temperature/humidity rooms, and so on. In addition, the following support facilities are available in Haworth:

1) **Microscopy and Analytical Imaging (MAI) Laboratory**: [http://www.mai.ku.edu/]. This facility is run by two full-time staff members and provides training and imaging/analytical services on a large range of microscopes and imaging equipment (see Appendix D for complete details).

2) **The Biology Teaching Resource Center (BTRC)**. This facility provides a study environment for biology students, and a full-time associate can assist with audiovisual aids for classroom instruction and research seminars.

3) **Biographics**: This is a graphic arts studio, staffed by one artist/photographer.

4) **Biohelp**: Two full-time IT professionals offer a range of services, including maintenance of software and hardware for research and teaching purposes. Biohelp is sponsored jointly by MB, EEB, and KUUB.

5) **Bioshop**: One full-time associate offers various services, from equipment maintenance and repair, to small construction projects.

6) **Storeroom**: One full-time associate stocks chemicals, reagent kits, enzymes, plastic ware, notebooks, and other everyday lab supplies. The storeroom also handles all express mail and large box deliveries and departures.

An impressive number of other core facilities are located on west campus and available to MB faculty on an at-cost basis. A full description of these cores are provided in Appendix D.

**Research Overhead Return**

The indirect cost rate (ICR) for the University grants is 47%, five percent of which is returned to the Department. The Department uses these funds (roughly $100K/yr) primarily to: 1) provide summer stipends and cover tuition expenses of graduate students who have no other means of support; 2) provide bridging funds ($1-10K) to labs that are between grants; 3) repair freezers and other essential equipment (this is usually done on a cost share basis with the faculty member) and; 4) help purchase new common equipment. In most cases, the costs of major equipment purchases have been shared between the College and Department, or between the College, Department and Investigators.

**QUESTION FOR THE REVIEW COMMITTEE**

7) Are we using our overhead return appropriately to support our goals?

**SUMMARY**

The Department of Molecular Biosciences conducts research and trains undergraduate and graduate students in a broad range of areas. Despite the diversity of our research activities, we are united by a shared interest in understanding fundamental biological problems at a molecular level, and a commitment to excel as teachers and service providers to the community. We feel that the future of the Department is bright. However, we believe that we can do better. We have benefited greatly from the high level of support we have received from the University and the College. This support must continue for us to maintain an upward trajectory in our productivity and scholarship.
We have posed the following questions to the committee:

1) Should we continue to build breadth in our science, or should we focus on one or a few areas of research and, if so, which areas?
2) What is the ideal number of non-tenure track lecturers for a Department of our size?
3) What can the Department do to benefit best from the university-wide initiatives in Bioinformatics/Computational Biology, Cancer Biology, and the Neurosciences?
4) How many students should we have in our graduate program and what mix of Masters and Ph.D students should we have?
5) What teaching loads should be expected of our students?
6) Do we have a reasonable number of undergraduate degree programs for the numbers of students and faculty that we have?
7) Are we using our overhead return appropriately to support our goals?
1. Program highlights

- The Molecular Biosciences (MB) Department offers a diverse range of degree programs on the Lawrence campus. These include BA and BS degrees in Biochemistry, Biology, Cell Biology, Genetics, Microbiology and Neurobiology and a cross-disciplinary program in Human Biology.

- A degree in Molecular Biosciences is also offered at the Edwards campus. This degree combines many of the mainstream science courses offered for the specialty degrees into a single degree that best serves the special needs of student in the Kansas City area.

- MB awards PhD and occasional MA degrees in Biochemistry and Biophysics, Molecular, Cellular and Developmental Biology and Microbiology. Department faculty members also participate in interdisciplinary, cross-campus PhD degree programs in Bioinformatics, Genetics and Neurobiology. The faculty of the Molecular Biosciences department are nationally and internationally recognized as leaders in their fields and offer truly state-of-the-art training.

- Students choose from a wide range of research mentors with research interests ranging from understanding very basic cellular processes to discovering the underpinnings of cancer and neurological disorders.

- Students in the MB undergraduate programs receive a world-class training in their respective disciplines and the majority of them proceed directly into the workforce or to top-flight graduate programs or postgraduate positions. A considerable number of MB graduates proceed directly to Medical or Dental school. Others work in biotechnology, medical or basic science laboratories.

- Students in the Lawrence Campus MA and PhD programs are in high demand in industry or academic settings. A good many proceed to postdoctoral studies and from there to faculty positions or scientific positions in pharmaceutical industries including department heads and CEOs.

- MB faculty secure between $6m and $10m in external research funds annually which are used to support a cadre of outstanding undergraduate and graduate students, technicians and postdoctoral associates. This makes for an exceptionally lively and productive research environment. Faculty publish regularly in top-tier journals, often with undergraduate and graduate students as co-authors. Lists of current publications as well as alumni profiles and recent faculty and student achievements are highlighted monthly on the departmental web site (http://www.molecularbiosciences.ku.edu/).