

2015 Strategic Plan

Interdisciplinary Graduate Program in Molecular and Cellular Biology

The Molecular and Cellular Biology Program (MCB) is the oldest of the four interdisciplinary programs in the College of Natural Sciences. The MCB Program was approved as a degree-granting graduate program by UMass, Amherst in 1983 and by the UMass Board of Regents in 1984. The initial faculty roster consisted of 26 faculty members from four UMass, Amherst departments and included representatives from the Five Colleges. The first entering class consisted of eight Ph.D. students. The MCB Program was overseen by a Director who was advised by a Steering Committee, an administrative structure that still remains.

Currently the faculty consists of 100 members from 17 departments and Smith and Amherst Colleges. The majority of faculty come from 5 departments; Biology (23), Vet & Animal Sciences (17), BMB (14), Chemistry (12) and Microbiology (7). The current student body numbers 73 with 19 students housed in Vet & Animal Sciences, 15 in BMB, 8 in Biology, 5 in chemistry, 2 in Physics, 1 in Microbiology and the remaining in other departments associated with the MCB Program (see Table 1 for MCB faculty and student trends from 2000-2015).

The MCB program is supported by an administrative staff. The first full time MCB Program administrative staff member was hired in 1986 and over the past three decades, 1.5-2 staff members supported the MCB Program. Since 2014, MCB staff is comprised of one full-time member.

MCB encompasses a very broad number of related disciplines in the biological, biochemical and biophysical sciences. Indeed it is this “broadness” that appeals to students and is certainly the major factor contributing to the large number of yearly applicants to the program. The opportunity to be a part of a diverse graduate program with training possibilities in a wide variety of areas is very appealing to graduate students. Additionally, the breadth of the program makes collaborations between faculty natural and facilitates collaborations across disciplines. Currently MCB is divided into three major research clusters: Biological Chemistry and Molecular Biophysics, Cellular and Developmental Biology and Biomedicine. These three broad categories each include several sub-groups and form the basis for interdepartmental meetings and informal working groups.

MCB faculty have worked closely with the establishment of the Institute for Applied Life Sciences (IALS) and two centers within IALS, Models to Medicine and Center for Bioactive Delivery, are comprised mainly of faculty from MCB. Several core facilities within IALS have been spearheaded by MCB faculty, including the NMR core, the Mass Spec core, the Flow Cytometry and Animal Imaging core, the Biophysical Characterization core and the Light Microscopy core. These core facilities as well as the associated research conducted within IALS will provide both students and faculty with state of the art tools and resources to enhance their research. Additionally students will be introduced to connections with industry through participation in the IALS mission. We envision this allowing our graduate students to be extremely well prepared for careers in a variety of areas of modern biotechnology.

MCB exists to train graduate students and, over the past 30+ years, MCB has graduated close to 400 students with either an MS or PhD in MCB. MCB PhD students spend the first

year rotating in two different laboratories with an occasional student requesting a 3rd summer rotation. By the fall of the second year, all MCB students have matched with home lab for their PhD research. MCB students are supported in the 1st year by TA assignments in a number of departments with Biology and BMB contributing the vast majority of TA positions. Currently MCB students also TA in Chemistry, Vet & Animal Sciences, Microbiology and Amherst College. Our most recent AQAD review suggested that TA duties would be better conducted after the first year but there appears no simple mechanism for supporting first year students while they rotate in faculty labs. This has been a discussion within MCB for several years and the program would welcome suggestions from the administration that could help us solve this problem. As detailed in the 2013 Academic Analytics report, MCB students complete their PhD within 5+ years which is not significantly above the norm of other MCB Programs.

In addition to TA positions for first year students and RA positions provided by faculty advisors, MCB students also have available training grant support. The Chemistry department has long been the recipient of a CBI T32 training grant from NIGMS and many MCB students have been the recipient of CBI training funds. Additionally the Stem Diversity Institute has provided 1st and last year funding for diversity students and all MCB diversity students have received funding through this program. It should be noted that this funding has dramatically increased the numbers of diversity students who apply as well as matriculate in MCB. Lastly, we recently received another T32 award from NIGMS in Biotechnology. Therefore MCB students have three additional mechanisms of support as well as the additional infrastructure created by these three federally supported training vehicles.

Over the past two years, the Graduate School has greatly enhanced the MCB program (and other STEM graduate programs) by the creation of an Office of Professional Development headed by Shana Passonno. This office has been instrumental in introducing graduate students to the myriad of career opportunities open to graduates in the life sciences. In addition to introducing current students to career opportunities, this office also invites graduates from the MCB Program back to campus thus providing a network for our current graduate students with those student now in the workforces. This has been invaluable and allowed several current students to identify contacts and facilitate job opportunities. MCB also welcomes the addition of a new day long graduate orientation scheduled for new incoming graduate students prior to the beginning of classes in September 2105.

Graduate student support after the first year is intended to be derived from research assistantships provided by faculty research support. In past years, essentially all graduate student support during in year 2 through the completion of a PhD was through faculty grants. In more recent years (post 2009), it has been increasingly difficult for faculty to consistently provide graduate student support on grant funds. The dramatic decrease in federal funding coupled with the equally dramatic increase in the UMass curriculum fees over this time period has made it necessary to reduce the incoming classes over the past several years. Thus while we had 93 MCB graduate students enrolled in 2008, we now have 73 students. We expect to take 12-15 students for fall 2015 but unless federal support for research increases, we do not expect to increase the MCB student body size above 90 students.

As an interdisciplinary program, MCB has not had the opportunity to hire faculty, a process that is controlled solely by departments. While MCB agrees that departments, with teaching needs as well as research goals, should be the major administrative unit recruiting and hiring new faculty, departmental needs do not always match graduate program needs. For example, there are many more graduate students who seek experience and training in some aspect in cancer biology than faculty who conduct such research at UMass. Since UMass Amherst is not associated with a medical school, it is not surprising that we have few faculty who conduct research in this area. There are several other such examples where a perceived MCB research need might differ from departmental needs. It is likely the other IDPs face similar constraints and it would be beneficial to IDPs to, at the very least, have some say in a small percentage of hires and perhaps even have small number of hires occasionally, solely within the realm of the IDPs.

Over the past year, MCB has worked closely with Vice Provost Betsy Dumont to devise best practices for reorganization of the graduate programs in the life sciences. This planning process resulted in a document presented to Dean Goodwin in early April 2015. The plan outlined in this document was discussed at length on several occasions with the MCB Steering Committee as well as with many faculty within the program. Overall, as a group, MCB is highly supportive of this document and envisions the benefits from this plan to be numerous. Currently, each IDP works in a virtual vacuum designing curriculum as well as best practices for their respective graduate students. There are many classes as well as aspects of graduate education that could easily be shared across IDPs and the proposed reorganization addresses these in detail. Overall, it is likely that MCB students will be part of a better organized and better integrated training environment under this proposed reorganization.

There are many issues faced by MCB in the near future and these include low and non-competitive graduate stipends, addressing the appropriate number of faculty members and what constitutes membership in MCB and how to appropriately size incoming classes. However, in lieu of the CNS response to the *Report on Interdepartmental Graduate Programs* submitted on April 1, 2015, it is inappropriate to address future plans for MCB. We look forward to a response in the near future at which point we will gladly begin planning for what we hope is a bright future for the MCB Program.

TABLE 1 DEPARTMENT	FACULTY			STUDENTS		
	2000	Fall 2007 ^a	Spring 2015 ^a	2000	Fall 2007	Spring 2015
Biochemistry & Molecular Biology	15	14 (4.7) ^f	14 (3.4)	22	20	15
Biology	19	20 (6.7)	23 (5.1)	15	22	8
Chemistry	6	8 (10.8)	12 (6.1)	3	5	5
Food Science	2	2	3	0	0	0
Chemical Eng.	0	1	3	0	0	1
Microbiology	4	7 (7)	7 (2.7)	1	3	1
Physics	0	1	4	0	0	2
PSIS (Stockbridge)	3	2	1	0	0	0
PSE	0	1	3	0	0	1
Psychology	6	4	1	0	1	1
Vet. & Animal Sci.	7	13 (12.3)	17 (7.1)	8	14	19
Other ^d	1	0	6	2	0	2
Amherst Coll.	6	3	1	2	0	0
Mt. Holyoke	4	0	0	0	0	0
Smith Coll.	5	3	3	4	2	3
PVLSI	0	4	2	0	14 (5) ^b	1
TOTAL	78	83	100	57	81^c	59^e

^a Core faculty only

^b 5 students in residence at PVLSI;

^c 12 students were performing lab rotations not included in total

^d 2015: Env. Health & Sci (2), Kinesiology (2), Nutrition (2)

^e 14 students performing lab rotations not included in total

^f Award Dollars (direct & indirect) in millions (in rounded up numbers). Figures collected from AWARDS from Jordan Online collected from Jan 1 2007 – April 8 2008 for data in column under Fall 2007 and Jan 1 2014 – April 8, 2015 for data in column under Spring 2015