



# Lessons Learned from Supervising PSM Program Students

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## Introduction

California State University is a comprehensive master degree granting university in the Central Valley of California. It is characterized by a diverse student body (Hispanic serving) made up largely of first generation college students. In 1988 a post-baccalaureate program awarding a Certificate of Advanced Study in Biotechnology was begun. Building on the success of that program, we instituted a Master's of Biotechnology Program in 2005. Designated a Professional Science Master's Program (PSM), we have ten graduates to date and expect five more this semester. Graduate programs at Fresno State draw largely from regional communities; however, the PSM in Biotechnology has drawn a large percentage of international students (65% from India, Ghana, Spain, Australia, China, Canada, and Iran. Two PSM programs are active at California State University, Fresno, and a third is under development.

In this presentation, we share the results of a self assessment, performed to improve program quality, increase student retention, improve application decisions, and decrease the time required to complete the program. We have found three changes to bring positive change to the program.

1. Placement of the Student Handbook on the Program Web site
2. Changes to the admission criteria
3. Increased communication with mandatory advising and meetings to help students how to navigate the program.

Successful integration of the administratively distinct science and "plus" elements in a Professional Science Master's (PSM) Degree, including on- and off-campus participants, is essential for the program to flourish. During program development, approval and launch, a PSM Program Director tends to focus on integrating and managing the program delivery elements, e.g. involved colleges, departments, faculty, employers, and relevant university student services staff, when the students themselves arrive, sometimes challenging logistical issues come to the forefront. Two PSM programs are active at California State University, Fresno, and a third is under development; this report addresses some lessons learned from implementation of the PSM in Biotechnology.

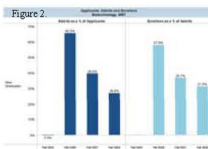
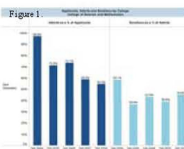
Table 1. Retention rates for first-time graduate students

First-Time Graduates Biotechnology, MBT*					
	Fall 2005	Fall 2006	Fall 2007	Grand Total	
Entered	2	11	11	24	
Returned %	0	10	4	14	
Returned %	0.0%	90.9%	36.4%	58.3%	

\*There was no new First-Time Graduate enrollment in Fall 2006 and Fall 2008.

First-Time Graduates College of Science and Mathematics						
	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Grand Total	
Entered	35	33	52	69	172	261
Returned %	31	31	42	56	47	207
Returned %	88.6%	93.9%	80.8%	81.2%	80.3%	79.2%

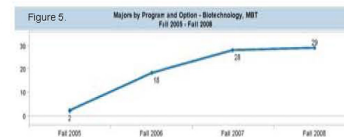
First-Time Graduates University						
	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2007	Grand Total
Entered	305	379	412	443	467	2,006
Returned %	310	320	348	385	405	1,732
Returned %	88.5%	84.4%	84.7%	87.0%	87.0%	86.3%



## Results - Admission Criteria

Table 1 shows the retention rate for the second and third years of the Biotechnology program (1A) and compares the rate to the College rate (1B) and the University rate (1C). Two admitted students transferred into the program the first year (2005) from other graduate programs on campus and are not included in these numbers. Retention fell dramatically for students admitted in Fall 2007. We investigated what led to the problem. We found that most of the students left the program failing, though a few students transferred to other graduate programs, both on and off campus. We decided to review the admission criteria to find if we could prevent admitting students who would fail. We had an adequate number of applicants (Figures 1 & 2) to choose successful students. We tested the information we had when making admission decisions – GPA, GRE scores, TOEFL scores, letters of recommendation, work experience, and responses to application questions. We found that work experience overwhelmingly correlated with success in the program. We also found that the differences in the GRE writing or analytical score was statistically significant ( $p = 0.04$ ) in successful students versus students who failed or struggled. The other collected data were not statistically significant in predicting student success.

Figure 4. Fresno State Master's in Biotechnology web site, showing the summary page of student handbook.



## Results – Time to Graduation

Though the number of students enrolled has increased each year (Figure 5), the number of graduates from the program has lagged behind. In 2008 four students graduated and in 2009 six students graduated. We studied what limited the graduation rate and found that 90% of the students graduated within nine months of completing the graduate writing requirement. We found that students were comfortable completing classroom activities, but were unsure about navigating less structured requirements: engaging in research, completing the graduate writing requirement, and applying for internships. Furthermore, students share misinformation, leading to delayed graduations and frustration. To combat these problems we:

1. Added a student handbook to the web site (Figure 4). The site is always available and never "lost"
2. Increased "meet and greet" opportunities for graduates with industry representatives to develop contacts for internships and jobs.
3. Hosted gatherings of faculty and students to talk about research opportunities and the graduate program
4. Held workshops on completing the graduate writing requirement, writing a resume, and writing a research report.



## Conclusions

One year after implementing the changes in our program we have seen an increase in retention (72% with the Fall 2008 cohort). Furthermore, students are progressing through the program in a more timely manner. It is likely that this cohort of students will require, on average, 2.5 years to graduate. Though it's an improvement over 3.2 years, there is more work to do. Our results show that regular review of application processes and program communication patterns is necessary to optimize program success. Courses in the program are also reviewed, to keep content current and to meet the evolving needs of industry.