

## EXECUTIVE SUMMARY

Academic Program Review  
College of Arts and Sciences

## PROGRAM

Professional Science Master's (PSM) in Biotechnology

## EXTERNAL REVIEWERS

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## CAMPUS VISIT DATES

October 12 - 13, 2021

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*Draft reviewed and approved by:* Faculty of the PSM in Biotechnology, Director of Bioentrepreneurship, and the Dean of the College of Arts & Sciences at the University of San Francisco

The review team read the self-study written by faculty in the PSM Biotechnology program and the Director of Bioentrepreneurship, reviewed the curriculum, course syllabi and evaluations; interviewed faculty, students and staff; and met with the Dean, Associate Dean and other relevant members of the campus community. Prior to their visit, the reviewers were provided with USF's Vision, Mission, Values Statement, and other university materials.

- 1. How did the external review committee rate the quality of the program – excellent, very good, good, adequate, or poor? How does the program compare with benchmark top-tier programs nationally? Please provide a brief rationale for the external review committee's rating.**

The external review team gave the Program a rating of GOOD, noting that they, “feel the curriculum upon revision would reach the Very Good/Excellent range.” With this said, the external reviewers commend the PSM in Biotechnology program, stating that USF’s program competes with some of the most successful national programs (including the Master of Business and Science program at the Keck Graduate Institute), while also differentiating themselves through unique opportunities, such as Academic Global Immersion (AGI) Bioentrepreneurship courses. The strength of Biotechnology program’s laboratory course design and implementation are believed to be “a driving force behind the high job placement rates for graduates.” The reviewers also “applaud the work the program has done to develop and assess program learning outcomes,” and recognize the “upbeat and positive” PSM in Biotechnology faculty, who have “excellent records of scholarship in leading edge biotechnology techniques and approaches.” Overall, the External Reviewers’ Report communicates a program that is “very highly regarded” by students, faculty, staff, and alumni. The reviewers themselves state “there were very few negative comments” about the program and that their report details mere “suggestions for improvement” to an already successful graduate program.

## **2. What are the most important general issues/challenges that emerged from the external review process?**

The external reviewers agreed with the program’s plan for improvement, as outlined in the Self Study, focusing on the following areas: admissions, increasing faculty and staff, updating curriculum, and coordinating internships. They also suggested some ways to strengthen the bioentrepreneurship course offerings. These suggestions focus on the fifth Program Learning Outcome and center on the ability to set up coursework for students that results in specific outcomes. “For example, students take courses in regulatory affairs, bioinnovation management, and bioentrepreneurship, however, the expectations or anticipated outcomes in terms of what students will know or be able to do as a result of taking these courses is not delineated in the program learning objectives. Will students be able to describe the current laws governing clinical trials, manufacturing medical devices, and regulatory approval processes both in the United States and abroad, or have the ability to effectively communicate with the broad range of participants and contributors in the regulatory field? Will they be able to explain the primary functions of management or describe the different types of managers and the roles they play?” In response, the Director of Bioentrepreneurship noted that USF’s program is not solely focused on Education in Service to Biotech Startups (Bioentrepreneurship 1.0), but goes further to understand what is considered

Education in Service of Biotechnology Innovation Ecosystems (Bioentrepreneurship 2.0), an approach to coursework and curriculum that goes beyond the issues of startups.

The external reviewers felt strongly that the Program Manager for the Biotechnology program should be moved to full-time, and that additional faculty are necessary “should the program grow beyond incoming cohorts of ~28 students.” Increasing the Program Manager from a part-time support to a full-time role would assist the program greatly with student recruitment and retention, and other initiatives. In addition, the reviewers suggest that Biotechnology should remain “an active participant in any planning of new or refurbishment of STEM spaces on campus,” as additional laboratory space would be necessary, again, if the program increases the size of their student body.

**3. What specific recommendations for improving the program’s quality has the external review committee made to the Dean?**

- I. Realign the business and entrepreneurship curriculum to better map to existing business and management skills in the context of biotechnology. This reimagined curriculum would align the PSM program better with peer programs that have arisen in the past ten years and provide students with marketable skills to complement the laboratory and experimental skills they develop in the PSM program.
- II. Focus on increasing the quality and quantity of the applicant pool to solidify the ~28-30 person incoming class size. From this foundation the program can plan its increase in cohort size which will require additional faculty and likely access to an additional teaching lab space.
- III. Increase the part-time program manager to full-time for the PSM program.
- IV. Revisit the current mission and program learning objectives to more accurately reflect the impact the program is making, and reinforce strategic and operational directions.
- V. In addition to merit-based scholarships, we suggest the department consider average academic performance scholarships that also give weight to the individual’s community services, commitment to diversity, leadership qualities, and the strength of the applicant’s purpose statement.
- VI. The PSM Program should be an active participant in any planning of new or refurbishment of STEM spaces on campus. The PSM Program can offer efficient use of such spaces by utilizing these spaces in the evenings, if these spaces are used for undergraduate classes during the daytime.

- VII. Dedicating or finding external resources to the maintenance and replacement of expensive equipment in future years, such as the bioinformatics server cluster, flow cytometer, tissue culture hoods, and confocal microscope.

The review team also offered additional suggestions to the program:

- Set advisory board term limits
- Create a business/entrepreneurship advisory board, smaller than the Biotechnology advisory board, to provide external feedback if the PSM program designs this portion of the program.
- Host summer symposia and/or special programming such as a “biohack-a-thon”
- Build partnerships with community colleges and recruit transfer students into the 4+1 program, and/or target recruitment from West Coast, Jesuit, or Catholic institutions without graduate opportunities in the sciences

**4. In the opinion of the external review committee, is the program following the University’s strategic initiatives?**

The review team found that the PSM in Biotechnology is not only in line with University initiatives, but a leading example of a successful graduate program at USF with high rates of student success while enrolled and after graduation. The reviewers wrote, “The program combines meaningful practical experience with excellent classroom instruction to empower students to be independent critical thinkers, engaged citizens, and creative and competent professionals. In addition to industry focused courses in genetics, molecular biology, and bioinformatics students are exposed to social and ethical issues in Biotechnology, and enrolled in MBA level courses in Global and US Regulatory Affairs, Bioinnovation and Management, and Bioentrepreneurship. While the curriculum certainly prepares students to successfully “enter” the biotechnology industry we believe it does more than this. A large portion of those enrolled in the program are currently employed in the life science industry and are enrolled in the program to help “advance” their careers. And indeed the program is delivering in this regard. The program prepares students to advance their careers beyond the bench, to raise their status with their current biotechnology employers, and even to embark upon a successful biotech venture.”

**5. In what way is the program contributing to the goal of making the University of San Francisco a premier Jesuit, Catholic urban university with a global perspective that educates leaders who will fashion a more humane and just world?**

The review team found that the Biotechnology faculty view their role “as one of not only training students to apply principles of science and technology, and to use best business practices to meet the needs of the biotechnology industry and associated organizations, but also equipping students with scientific, ethical, and technical leadership skills, to enable them to solve a wide array of problems that will make the world a better place. As a Jesuit institution the PSMB understands the critical role they play in educating students who are going to be really good scientists or business leaders, but who are also looking out for other people and the good of the world. Learning to think about people outside of themselves as they move forward in their careers is as important as the science or business in which they will be immersed.”

**6. What is the timetable for the response to the external review committee’s recommendations for program improvement? What can the Office of the Provost do to appropriately respond to the review?**

The next step is for the Dean, Associate Dean, and Associate Director of Assessment to meet with the faculty of the PSM in Biotechnology program and the Director of Bioentrepreneurship and discuss the action plan based on the self-study and reviewers’ report. Based on the reviewers’ suggestions, the Office of the Provost could assist the program by: increasing the Program Manager position to full-time, assisting the program in identifying space and resources for Biotechnology events, and approaching conversations about space on campus with an awareness of the needs of the Biotechnology program.