

**Comprehensive Program Review**  
**Department of Biology**  
**Georgia State University**  
**November 2021**

The following programs are critical to the institutional mission and thus MEET the institution's criteria for retention.

The Department of Biology offers a B.S. degree program in which students can follow a General Studies curriculum or choose one of five concentrations: Ecology, Evolution and Organismal Biology; Microbiology; Molecular Genetics and Cell Biology; Neurobiology; and Pre-Medical/Pre-Health. There are also three dual-degree options that students may pursue in conjunction with their B.S. course of study. These programs allow students in the undergraduate Biology program to use up to 12 credit hours towards a M.S. Currently, dual-degree programs exist in which students may join the M.S. programs in Biology, Medical Science, or Nutrition. Since Fall of 2011, more than 2000 students per year have enrolled in the B.S. program in the Department of Biology. In the past four years, enrollment has been on the rise. In the Fall semesters of 2017, 2018, 2019, and 2020, the program had 2127, 2294, 2347, and 2393 majors, respectively. Goals 3A-F aim to maintain and improve the quality of our program.

The Biology Department offers a Ph.D. in Biology. Up to FY 2021, incoming Ph.D. students could pursue one of five concentrations: 1) Applied and Environmental Microbiology (AEM); 2) Cellular and Molecular Biology and Physiology (CPB); 3) Molecular Genetics and Biochemistry (MGB); 4) Neurobiology and Behavior (NBB); and 5) Molecular Genetics and Biochemistry (MGB) with Interdisciplinary Specialization in Bioinformatics (BIN). In the Fall semesters of 2017, 2018, 2019, and 2020, the program had 91, 85, 75, and 57 graduate students, respectively. Effective Spring 2021, the University approved significant changes to the Biology Ph.D. program to increase the quality and attractiveness and bring the program more in line with similar programs at peer institutions. These changes include an increase in stipend, reduction of credit hours, more flexibility in, and better assortment of, required courses, implementation of guidance committees and individualized development plan. Execution of these changes will be a major goal for the coming five years (Goals 2A, B, D, and E).

The Biology Department offers an M.S. in Biology. Up to FY 2021, students could pursue one of the concentrations listed above for the Ph.D. program, or concentrations in Medical Sciences (MBMS) or Biotechnology (BTYN), or a General Degree in Biology. A Dual Degree (4+1) MS program was added in 2017. Department Faculty as well as Associate Faculty who are members of the Graduate Faculty can direct Ph.D. and thesis M.S. graduate students. In the Fall semesters of 2017, 2018, 2019, and 2020, the program had 182, 158, 154, and 159 M.S. students, respectively. Effective Spring 2021, the University approved significant changes to the Biology M.S. program similar to those in the Ph.D. program. Execution of these changes will be a major goal for the coming five years (Goals 2D, D, and E).

Provost/VPAA Signature and Date\_\_\_\_\_

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Provost/VPAA's Designee Signature and Date Michael Galchinsky 11/10/2021

## Appendix: APR Action Plan

### Department of Biology

August 2021

#### 1. Major Findings of the Current Review

**Research program and faculty demographics:** The reviewers and the self-study report agree that Biology's largest challenge is the steady decline in the number of tenure track (TT) faculty (from a high of around 40 to 20), which has led to an unacceptably high student-faculty ratio of well over 50:1. As non-tenure track (NTT) faculty numbers have stayed relatively stable, NTT faculty currently outnumber TT faculty, fueling a concern that the department is changing into a teaching department. With several senior faculty above retirement age, this problem is likely to worsen. Research funding generated by TT faculty is still relatively high compared to that at R1 peer institutions. However, as some of the most productive faculty also are among the oldest, funding is likely to decline without new hires. Recent and upcoming retirements of TT faculty, however, generate opportunities to hire new faculty within areas of current and emerging strength and will help build necessary bridges with life scientists in other campus units. The self-study report and reviewers also shared concerns about the technology offerings, staffing, and financial structure (e.g., level of billing for services) of the Biology core facilities. The Action Plan directly addresses these issues.

**Graduate Program:** The self-study report and reviewers agree that the decline in TT faculty numbers is a primary factor in the decline in the number of doctoral students, limits graduate course offerings, and reduces master's student training opportunities. Our program offers lower stipends, lacks compelling research foci, and, like our master's program, requires more credit hours than programs at peer institutions, all factors that make our program less attractive. The reviewers also suggested improving the website appeal. Several action points deal directly with these issues. Although the number of master's students has been relatively stable, the number that opt for a research track is declining, and programs have not been optimized for College to Career progression. The Action Plan outlines similar corrective changes as proposed for the doctoral program.

**Undergraduate Program:** The reviewers were impressed by the quality and size of the undergraduate program, which has seen significant increases in the number of majors and of students that take Biology service courses as a requirement for other programs. The reviewers commented on the high quality of our NTT faculty, but noticed that this group is under stress due to relatively low salaries and continuing increases in workload due to growing student numbers. The self-study report and the reviewers agree that the decline in TT faculty members contributes to a dearth in upper-level classes in faculty specialty areas and in opportunities for our undergraduates to participate in research experiences with TT faculty. Our self-study also identified curricular assessment, college-to-career initiatives, and access to signature experiences as foci for further development.

**Outreach Program:** Reviewers noted that outreach was strong (e.g., BioBus, high school research experience), but BioBus needs support (e.g., federal grants, corporate sponsorship) to be sustainable.

#### 2. Action Plan for the Coming Cycle

##### Goal 1: Maintain areas of strength and develop new ones in our research program

###### a. Objective: Recruit new and diverse TT junior faculty.

As suggested by the reviewers, the Chair will make hiring junior TT faculty the highest priority to counter recent and expected future decline in faculty numbers. The department will seek permission to search for new TT faculty annually as part of the college hiring process, and will pursue all special opportunities for strategic faculty position funding. We will aim for faculty who can increase diversity in the department, position us better for multi-PI research and training grants, and increase ties with other Life Science units on campus. We will match faculty with experienced mentors from across Life Science units to facilitate their progress to promotion and tenure. (Year 1 and ongoing)

**b. Promote current research strengths in Biology and develop new ones**

The Chair will work with staff to promote departmental research strengths (i.e., Microbiology and Virology; Cellular Biology, Immunology, and Physiology; Molecular Biology and Genetics; and Bioinformatics and Systems Biology) by featuring these areas on our website, by stimulating collaborative research, and by building an intellectual community around these focal areas that extends beyond the department. (Year 1 and ongoing)

**c. Bring Core Facilities up-to-date and reorganize their governance**

The Chair will work with the College, the Research Office, and Chairs of Chemistry, Neuroscience, Geosciences, and IBMS, to develop a shared management system for our core facilities to ensure upkeep of existing, purchase of new, and sunset of outdated equipment. (Year 1 and 2)

**d. Formalize connections with other units to promote collaborative research**

The Chair and faculty will decide on the rights and obligations of associate membership of the Biology Department, and codify policies and procedures in departmental bylaws. Faculty in other units who's educational and research programs overlap with or complement those of Biology will be invited to become associate members. The Chair and Biology faculty will also work with the Dean, Provost, and chairs and faculty of other Life Science units in ideating the development of a structure that supports a strong, visible, and collaborative life science community at Georgia State. (Years 1-3)

**Goal 2: Reorganize and reinvigorate our graduate programs to promote student recruitment, progression, retention, and career placement.**

**a. Reorganize and reinvigorate the Doctoral Program**

The DGS will shepherd changes to bring the program in line with peer institutions, i.e., reduced credit hours, new courses to cover Responsible Conduct of Research (RCR), data analysis, and academic survival skills, increased flexibility in course selection, implementation of guidance committees and individualized development plans (IDPs), and less onerous qualifying exams (All of these in Years 1-3) The effectiveness of these changes will be measured by monitoring GPA, time to completion, publication and funding rate, and student feedback (Year 2 and ongoing).

**b. Bring PhD stipend up to market rate**

New students will be paid a stipend of \$28,000 paid by a combination of state funds (graduate teaching assistantships) and federal grants. This raise will pay for itself, as all incoming students will be expected to teach, whereas under the old system students were paid 'extra' if they taught. From Year 1 onwards, the Chair will provide guidance to PIs to generate funding for stipends from external sources. If successful, this would allow us to raise the stipends further, which is needed as \$28,000 is still below market rate. (Year 1 and ongoing)

**c. Reorganize and invigorate the Master of Science Program.**

The DGS will coordinate implementation of changes in the Master's program approved in 2020 and geared to bring the program in line with peer institutions. Changes include an increase in flexibility, credit hours reduction, and restricting educational tracks to general Master's or a choice between just four concentrations (Research, Medical Science (MBMS), Bioinformatics (BIN), and Biotechnology (BTY), a required Life Sciences Professional Skills class, and use of IDPs. (Years 1 and 2)

**d. Boost College to Career options in doctoral and Master's programs.**

The DGS, co-directors of the Master's program, and Chair will review the BIN and BTY programs in consultation with external groups, such as the Atlanta Chamber of Commerce, to ensure they match market demands. Potential curriculum changes will be submitted for approval in Year 2. If approved, changes will be implemented from Year 3 onward. The DGS will ensure that students will receive more guidance to various career options.

### **e. Improve Recruitment of High-quality, Diverse Graduate Students**

We will improve the visibility of the graduate programs using our website and social media platforms. We will also generate and distribute new promotional material. To further increase the diversity of our program, the DGS will contact HBCUs and faculty will participate in scientific conferences and career fairs set up for biology minority students (e.g., ABSCM). In addition, we will contact minority undergraduates at Georgia State. (Year 1 and ongoing)

### **Goal 3: Maintain excellence in undergraduate education.**

#### **a. Improve retention and graduation rate**

The Director of Undergraduate Studies (DUS) will work with the Chair of the Curriculum Committee to integrate training in study and time management skills at an early stage in the curriculum. The DUS will also work with the College to identify courses in which students encounter the most obstacles and remove bottlenecks wherever possible. (Year 1 and ongoing)

#### **b. Curriculum assessment and review to improve career readiness**

In years 1 and 2, the Curriculum and Assessment Revision Committee (CAR) will review whether Biology courses meet approved Student Learning Outcomes (SLOs) and facilitate course revision where necessary. CAR and the Curriculum Committee will also identify gaps in our electives. The Chair will solicit faculty to fill those gaps. In years 1-5, CAR will develop and implement instruments for overall curriculum assessments to optimize horizontal and vertical alignment.

#### **c. Modernize teaching laboratories to optimize training in marketable skills**

In year 1, the DUS will review, and where necessary, revise laboratory course offerings to align them with market demands, in consultation with external groups as in Goal 2d. The DUS will institutionalize training of lab support staff in student-centered pedagogy and inquiry-based curricula. The Chair will work with the College to restore staffing in the 2310, 3890, and 3910 labs.

#### **d. Increase research opportunities for undergraduate students**

The DUS and Honors College liaison, Dr. Jonathan Sylvester, will develop a database of research opportunities for undergraduate students, including the availability of undergraduate positions in research labs. Dr. Paul Ulrich, Director of Program for Undergraduate Research in the Life Sciences (PURL), will coordinate expanding and diversifying Course-based Undergraduate Research Experience (CURE) offerings. (Year 1 and ongoing)

#### **e. Increase access to signature experiences other than research**

Over the next 3–5 years, the DUS and select faculty will develop a database of signature experiences and internships on- and off-campus. We will leverage existing contacts with local organizations and business to increase the number of internships available for our students. (Year 1 and ongoing)

#### **f. Develop multi-modality master courses**

Biology NTT faculty will continue to work with Perimeter College on Master Courses for online delivery of introductory courses. Student performance across sections will be tested for consistency, and courses will be modified as needed. The DUS will continue to develop resources to train faculty and GTAs in online education in collaboration with CETLOE (Years 1, 2, and 3)

### **Goal 4: Maintain and strengthen community outreach programs in the Atlanta region**

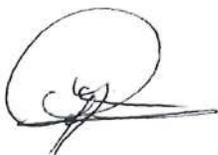
#### **a. Develop administrative structure for community outreach programs**

Chair and staff will develop new administrative structure to ensure continued health of Biology outreach programs. (Years 1 and 2)

#### **b. Enhance financial support for outreach programs**

The Chair will work with BioBus directors to pursue external funding opportunities (e.g., federal grants) to support the BioBus program and other outreach programs. (Year 1 and ongoing)

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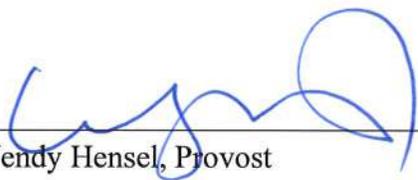
8/24/21

Geert de Vries, Chair



8/24/21

Sara Rosen, Dean, College of Arts and Sciences



8/24/21

Wendy Hensel, Provost