

Promoting PhD Excellence in the College of Arts and Sciences

Report and Recommendations of the PhD Excellence Bridge Committee April 28, 2020

Bridge Committee members

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The following Report and Recommendations were unanimously supported by the members of the PhD Excellence Bridge Committee

Committee Overview

The PhD Excellence Bridge Committee, formed in fall of 2019, was charged with creating a plan for how best to distribute College of Arts and Sciences resources for TAs and RAs in order to attract the very best PhD students to the College and ensure the very best outcomes for our PhD students.

The Bridge Committee, consisting of nine faculty members and one graduate student representative, has had twenty-four full committee meetings, numerous subcommittee meetings, and multiple conversations between committee members and various members of the faculty. In addition, the Committee has had frequent interactions with the Dean of Arts and Sciences and members of her staff as we assembled and reviewed considerable data related to graduate training in the College. The Committee also collected information about the resources side of PhD funding in the College including briefings about the financial operations of the College and distribution of money within the Dean's office.

In order to facilitate ongoing communication between the Committee and faculty, the Committee distributed updates to all College faculty describing Committee activities and held a meeting with faculty in December of 2019. A member of the CAS Policy Committee regularly attended Bridge Committee meetings. The Chair of the Bridge Committee frequently met with the Chair of the PhD Excellence Curriculum and Teaching Committee to share information about the Committees' activities and findings. In addition, the Bridge Committee received ongoing briefings from the Curriculum and Teaching Committee from a member serving on both committees. The Bridge Committee provided a summary of the committee's recommendations to the Chairs and Directors of the College in April of this year.

Context for the Bridge Committee Activities

The immediate prompt for the creation of the Bridge Committee was the decision during the late summer of 2019 at the university level to increase PhD student stipends to a minimum level and to transfer those increased costs to the College. This plan generated an apparent structural deficit in College finances – described by the Dean's office as a *budget crisis*. Absent other sources of money, it appeared that the number of state-supported PhD students would have to be cut to balance the College's budget. The Provost provided some additional funding to mitigate the shortfall, but this money only covered the increases for current students for three years (100% in year 1, 100% in year 2, and 50% in year 3) and did not cover student fees. Consequently, the long-term budget problem was delayed but not eliminated. The bridge funds from the Provost provided no funds for a new graduate cohort to be recruited for fall 2020.

From the outset, the Committee confronted two issues. The first was what to do about the upcoming recruitment cycle. The second was to formulate a systematic plan for the allocation of PhD funding across the College. The first issue was of urgent concern, as departments needed to move forward with their plans for graduate recruiting. In light of this urgency, the Committee concluded that decisions about allocation of money could not be conditioned on any of the factors that would ultimately inform the development of a comprehensive PhD Excellence plan. In November of 2019, the Committee recommended that the College of Arts and Sciences and the University allocate TA funds for 2020-21 that allowed departments to offer the same level of admissions as would have been expected prior to the funding changes implemented by the PhD Excellence Initiative. (See Appendix A

for the full recommendation.) This recommendation was accepted by the Dean, and departments were instructed to expect funding for PhD stipends at 2019-2020 funding levels.

Following the resolution of 2020-21 PhD funding levels, the Committee turned its attention to the complex issues of assessing the College's commitment to PhD training and reconfiguring the approach to allocation of stipend resources. The Committee intended to develop a systematic plan for the allocation of PhD funding across the College that would change the distributions of money to departments in line with the goals of the university-wide PhD Excellence Initiative. This plan would reflect detailed information from departments about graduate training and outcomes and would also consider financial information about College operations. Several of the members of the Bridge Committee continue to have reservations about the PhD Excellence Initiative. They question how it was formulated in the absence of significant faculty input, the speed with which it was implemented, and the enactment of the financial portions of the Initiative prior to the creation of a plan. We regard these recommendations not as an endorsement of the process followed by the PhD Excellence Initiative, therefore, but instead as a way to mitigate at least some of its potential negative consequences.

The ongoing work of the Committee has been informed by several guiding principles. Most importantly, the Committee recognized that excellence in PhD training was a critical component of the University and College mission. The primacy of this mission at the University at Buffalo informed the Committee's thinking about importance of the College's and University's allocation of resources to PhD training. The Committee also believed that recommendations for allocation of resources to departments would be strongly informed by data reflecting the PhD training performance of the departments. Accordingly, the Committee required accurate and complete data for each department. Moreover, given that data from any one year were unlikely to be representative, the Committee sought information about departmental performance collected over multiple years. Finally, the Committee decided that processes developed for distributing resources to departments should be completely transparent and subject to ongoing monitoring and correction. Relatedly, there should be no blind adherence to the allocation process with the understanding that unique departmental issues and special situations would arise that require adjustments.

Bridge Committee Recommendations

The College of Arts and Sciences should:

- 1. Increase its commitment to the PhD training mission**
- 2. Adopt a formal algorithm for distribution of PhD lines to departments**
- 3. Create a standing PhD Excellence Oversight Committee**

The College's commitment to PhD training must match the clear importance of PhD training as a foundational mission of the University. The distribution of training resources to departments must be systematically tied to information reflecting a department's performance in PhD training. The oversight of the allocation of resources to departments must be carried out by individuals charged with maintaining and enhancing PhD excellence in the College. The PhD Excellence Bridge Committee believes the overall success of a systematic program to substantially improve PhD training across the College depends on the full implementation of all three recommendations.

Each of these recommendations is detailed in the following sections of this report.

Recommendation 1: Increase CAS commitment to the PhD training mission

Conclusions from the Budget Data

The budget data we have received from the Dean's office suggests that rather than a budget crisis in the College, over the past ten years there has instead been a steady shift in priorities away from graduate education and the research mission of the University and toward an expansion of the Dean's office staff. At the same time that the budget for graduate education has remained static and tenure-track lines have declined, the Dean's staff has increased substantially, and the Dean has invested in a series of "Strategic Initiatives," the educational or research mission of which remains unclear to many members of the College community.¹

On the basis of the information we have received from the Dean's office, we make the following observations:

- During the same period that the tenure-track faculty decreased by 50 (468 in 2009 to 418 in 2020), the Dean's office staff increased by 32-34.²
- During the same period that expenditures on the Dean's office staff increased by at least \$2.5m (including hires made by Dean Schulze's immediate predecessor),³ expenditure on graduate education has remained almost entirely static.⁴

We also wish to note the following pertinent information:

¹ We have had considerable difficulty establishing accurate information about the staff in the Dean's office. Obstacles have included: discrepancies between the organizational chart, the salary list, and the Dean's Office website; data admitted to be incomplete (for example, the list of new positions which omitted between 5-8 new positions); missing data regarding the total annual budget for the Dean's office; missing job descriptions for the Dean's office staff.

² 16 of these positions were added by Dean Pittman. Historical information about faculty numbers were provided by the Dean's office. Current information was taken from Tableau.

³ On the basis of salary data provided by the Dean's office, we estimate the cost of Dean Pittman's additions to the Dean's Office staff at \$1,028,595. We estimate the cost of Dean Schulze's additions to the Dean's Office staff at \$1,516,126—although it could be much more depending on the compensation packages offered to faculty and staff members omitted from the salary list we were provided. Please note that this number also omits the cost of course replacements for the 5 new faculty members added to the Dean's office during her tenure.

⁴ According to data provided by the Dean's office, in 2010-2011 TA stipend expenditures were at \$11,173,719. In 2019-20 they were at \$11,456,431. Expenditures have ranged between \$9,928,507 (2016-2017) and \$12,328,034 (2012-2013). We have been informed that by 2022-2023, expenditures on TAs will go down to \$10,000,000—and this despite the increased base stipend required by the PhD Excellence Initiative and the fact that this total will cover student fees as well as stipends.

- During the same period that our MA enrollments decreased from 723 to 520, our Graduate Recruitment staff increased from 0 to 5.⁵ The total cost of that office, including salaries (~\$324,217) and travel and publications (\$59,050) is ~\$383,267.
- The three “Strategic Initiative” directorships that appear on the organizational chart total \$415,800.⁶
- Of the staff positions in the Dean’s office, 12 salaries are between \$100,000-150,000, 3 are between \$150,000-200,000, and 1 is above \$200,000. Two recent hires alone cost over \$400,000 per year.⁷
- Several of the new positions in the Dean’s office appear to duplicate functions performed elsewhere in the University or in individual departments:⁸

⁵ According to the Dean’s office, we had 723 MA students in 2009. This number went up to 815 in 2011. From there it has declined steadily. The last enrollment information we have is for 2018, when we had 520 MA students.

⁶ One additional Strategic Initiative Directorship appears on the website—the Director of the Strategic Initiative for Digital Humanities—but does not appear on the organizational chart.

⁷ This does not include the 6 faculty positions in the Dean’s office, all of which have base salaries between \$100,000-\$155,000 before the salary overrides and additional costs discussed below.

Although the cost of faculty Associate Dean positions might seem more appropriately attributed to departments than to the Dean’s office, because ADs do not typically teach and are not required to do any service within their departments, they should be assigned to the Dean’s budget. The Dean’s office informs us that typical salary supplements for AD positions is 39%: between salary override (9%), summer salary (9%), and research budget (21%). This is aside from the cost of course replacements and the opportunity cost to departments of having members of their faculty who “count” toward their TT total yet contribute little or nothing in terms of teaching or service.

⁸ As examples of potential duplication:

- Associate Dean for International Education (new) duplicates the Office for International Education, headed by Vice Provost John Wood.
- Director of the Center for Diversity Innovation (new) duplicates the Office for Inclusive Excellence (headed by Vice Provost Despina Stratigakos) and the Office for Equity, Diversity and Inclusion (headed by Director Sharon Nolan-Weiss).
- Associate Dean for Experiential Learning (new) duplicates the Experiential Learning Network, headed by Associate Dean Mara Huber. (The Associate Dean for Experiential Learning, along with the Associate Dean for Special Programs, replaced the 3/4 Associate Deanship that existed under the previous administration.)
- Communications (three new positions under Dean Schulze; two new positions under Dean Pittman) moves into the Dean’s office some responsibilities that have in the past been handled by individual departments.
- Community outreach (two new positions under Dean Schulze) duplicates the work of the University Development Office.

Because we were never provided the job descriptions we requested, this list most likely omits several redundancies within the Dean’s office as well as between the Dean’s office and other parts of the University. Also, please note that we are omitting from discussion five Advancement positions that appear on the CAS Dean’s Office website but do not appear on either her organizational chart or the list of positions. Our understanding is that these positions are staffed and funded by the University rather than the College.

At this perilous moment, the issue of fiscal responsibility could not be more pressing. While the faculty members of this committee have committed themselves to evidence-based, transparent, and collective decision-making in relation to the distribution of TA lines, new positions in the Dean's office appear to be created somewhat ad hoc without regard to budgetary constraints or transparent, systematic procedures for evaluation.

Our recommendations are as follows:

- Institute an immediate and complete hiring freeze in the Dean's office and direct all new expenditures to graduate education and tenure-track hiring;
- Require that any Covid-19-related budget cuts be directed first toward the Dean's office. We recommend this both as a way for the Dean to lead the College by example, and as a way to recommit to a faculty and a graduate body weakened by budgetary cutbacks that have not been shared by her office;
- Reevaluate the Strategic Initiatives. The total cost of the four current Initiatives is between \$1.815m and \$1.9m. We recommend evaluating each for its effectiveness as well as its impact on the educational and research missions of the University - just as we recommend evaluating the College's graduate programs on these grounds. We advocate redirecting as much funding as possible from these Initiatives to graduate education and diversification of tenure-track faculty.
- Establish a faculty oversight committee for all major expenditures in the Dean's office. We believe that the unchecked expansion of spending on the Dean's office has revealed weaknesses in the structure of CAS governance that should be reformed to prevent it from reoccurring in the future. We thus recommend enhancing faculty oversight to help ensure that funding will be allocated for core College missions of graduate education and tenure-track hiring, rather than being appropriated for additional hiring in the Dean's office. To accomplish this, we recommend establishing a CAS faculty Budget Committee, for both program evaluation of the Dean's initiatives and oversight of major expenditures in the Dean's office, including developing and implementing a flexible but meaningful target for limiting total Dean's office expenditures. In accordance with CAS bylaws, the Budget Committee should be established by the CAS Policy Committee and follow all bylaws of the College of Arts and Sciences as regards committee membership and selection of the committee chair;
- Work actively to promote better communication between different units within the University so as to minimize a duplication of functions that is costly in terms of efficiency as well as salaries;
- Reconsider the status of certain offices within the Dean's office whose efficacy is especially questionable.

Recommendation 2: Adopt a formal algorithm for distribution of PhD lines to departments

PhD Excellence Bridge Committee Funding Allocation Algorithm

The PhD Excellence Bridge Committee has developed guidelines in the form of an algorithm to help the Dean make decisions about allocation of PhD funding to departments. The algorithm is described in more detail below. Broadly, it involves a composite of four indices that is used determine relative standing among departments in the College to determine allocation of PhD funding to

departments. The algorithm includes a guardrail, which caps the share of resources directed to top-performing departments and thus slows the shift of funding away from poorer-performing departments. First, we describe the four indices that go into the algorithm, and then we describe the details of the algorithm itself.

The Committee discussed several areas that might be critical when thinking about graduate training, but not all made it into our final algorithm. For example, the committee considered prior differences in PhD stipend levels as a potential element of the allocation algorithm. Undergraduate curriculum teaching needs, credit hours taught by departments, faculty teaching load, number of undergraduate majors, and quality of admitted graduate applicants were discussed, but deemed not central to graduate student training and excellence. The Committee identified four primary domains that were viewed as critical to PhD training:

- Post-PhD Outcomes
- Attrition
- Diversity
- Time to Degree

These domains align with those targeted in the foundational documents of the PhD Excellence Initiative (<https://grad.buffalo.edu/explore/about/phd-excellence.html>) and with AAU guidelines for graduate program evaluation ([https://www.aau.edu/sites/default/files/AAU-Files/PhD/AAUGradEdRpt\(1998\).pdf](https://www.aau.edu/sites/default/files/AAU-Files/PhD/AAUGradEdRpt(1998).pdf)). They are also considered among “key vulnerabilities” in US graduate education identified in a recent report by Commission on Graduate Education in the United States (<http://www.fgereport.org/>). Post-PhD outcomes, attrition, diversity, and time-to-degree, form the basis for the criteria used in the Committee’s algorithm to help guide decisions about allocation of PhD funding. The Bridge Committee carefully considered the issue of the weighting of each domain in the final algorithm. Following extensive discussion, the Committee decided to differentially weigh the four algorithm domains in line with a general sense of the relative contribution of each domain to PhD excellence. PhD outcomes will be weighted 30%, Attrition and Diversity will be weighted 25% each, and Time to Degree will be weighted 20%.

The index derived within each of these domains is described next.

Post-PhD Outcomes

We reviewed the literature on graduate outcomes, which largely focuses on positions obtained post PhD, and also considered descriptions of favorable PhD outcomes provided by individual departments within the College. In doing so, we concluded that defining PhD-level outcomes solely based on obtaining a tenure-track academic position was too narrow. We adopted a more general definition for a PhD-level outcome, which is simply whether a given PhD graduate is **employed in a full-time position that requires a PhD**. We recognize that earning a PhD almost always enhances a graduate’s ability to improve employment opportunities, and that students are motivated to pursue a doctoral degree for a variety of reasons. However, if a post-PhD position could have been achieved with a lower level of education (e.g., a master’s or bachelor’s degree), then we have not efficiently used our PhD funding. The *Report of the University of Chicago’s Committee on Graduate Education* captures this sentiment: “Given the opportunity costs of PhD education, the training should open up a career path that would not have been accessible without it.”

(<https://provost.uchicago.edu/sites/default/files/Committee%20on%20Graduate%20Education%20Rep>

[ort.pdf](#)). Accordingly, the core attribute of a successful PhD outcome is whether a post-PhD position obtained requires a PhD degree. The future PhD Excellence Oversight Committee, which will oversee implementation of the algorithm, may consider instances in which a particular position does not formally require a PhD, but the overwhelming majority of incumbents in that position have a doctoral degree. With adequate data supporting this supposition, such positions could be considered PhD-level outcomes. Given these operationalizations, we did not consider teaching positions in primary or secondary education as PhD-level outcomes. Adjunct teaching positions were also not considered PhD-level outcomes. Although adjunct teaching typically requires a doctoral degree, these positions are often part-time and temporary. In contrast, we considered post-doctoral training positions as PhD-level outcomes because, although they are also temporary positions, they serve as a common pathway to more permanent tenure-track positions or non-academic PhD-level positions in many disciplines. Similarly, full-time instructor positions generally require a PhD, and while often not permanent, can be stepping stones to more permanent positions. The committee acknowledges that the current criteria for evaluating outcomes are problematic with respect to outcomes in the creative/artistic disciplines, such as creative writing and music composition. In such fields, the forms of activity widely acknowledged as PhD-level are often outside of the context of institutional employment and might be measured by such indicators as awards and commissions, publications, and public presentations in respected venues, etc.

Departments will be evaluated by the fraction of graduates having achieved PhD-level outcomes within a five-year look-back window. This is a simple and generic approach that applies to all disciplines, allows for a diverse range of positive outcomes, and emphasizes appropriate PhD-level employment as the desired outcome for students supported, fully or in part, by the College's state funds.

The Committee also considered the process to determine PhD-level outcomes. We made the conscious decision that these determinations should not be made solely by departments because of understandable biases that departments have to portray their own students in a positive light. Accordingly, the committee is proposing the following process:

1. In the initial-year application of the algorithm, the Outcomes Subcommittee of the PhD Excellence Bridge Committee (or some other combination of the PhD Excellence Bridge Committee members) will review updated PhD-outcomes spreadsheets for each department (based on outcomes reported 2014-2018), which will include the updated information provided by departments to the College in November 2019 and again updated by departments in February 2020. The subcommittee will assess whether each outcome is PhD-level (1) or not (0) according to the operationalization described above. (In subsequent years, the PhD Excellence Oversight Committee will assess outcomes.)
2. The Outcomes Subcommittee (in the future, the PhD Excellence Oversight Committee) will send the updated spreadsheets with outcome indicators to chairs and directors of graduate studies, with our operationalization of PhD-level outcome (described above) and a request for feedback on two points:
 - a. Updates to outcomes.
 - b. Suggested changes to the Committee's assessment of any outcomes as PhD-level or not, with a brief rationale for each suggested change.
3. The Outcomes Subcommittee (in the future, the PhD Excellence Oversight Committee) will:
 - a. Review changes suggested by departments and determine if the rationale is sufficient to warrant a change.

- b. Compute the percentage of PhD-level outcomes, which will be used as one of four indices in the proposed algorithm.

Attrition

Non-completion rate of doctoral programs is a national concern for administrators, faculty, and students (Council of Graduate Schools Report on “A *Data Driven Approach to Improving Doctoral Completion*”, (https://cgsnet.org/ckfinder/userfiles/files/Paper_Series_UGA.pdf). Doctoral training is a resource intensive enterprise. The department, faculty, and College invest a tremendous amount of time and money to recruit and train doctoral students. This investment has limited return for both the student and the university when a student leaves the program. Given fiscal pressures, it is imperative that we use our resources efficiently. Accordingly, we view attrition as an important index to consider. The average rate of attrition computed from an eight-year look-back window for each department will serve as the second index to be included in the proposed algorithm.

It is possible to calculate the actual monetary cost to the College associated with student attrition in each department. A student leaving after one year of College-funded PhD training will cost less than a student leaving after two or more years of training. The Committee did not have the data necessary to generate precise estimates of these varying costs. This issue, too, should be considered in more detail by the PhD Excellence Oversight Committee, which will monitor and modify the recommendations of the Bridge Committee.

Diversity

There are “practical, ethical, and intellectual” reasons to increase diversity of doctoral programs (*Diversity and the PhD: A review of Efforts to Broaden Diversity and Race in U.S. Doctoral Education. A report from the Woodrow Wilson National Fellowship Foundation*; http://woodrow.org/wp-content/uploads/2013/06/WW_Diversity_PhD_web.pdf). A public institution must serve the public; to do so in an increasingly diverse state, it is imperative that the College improve its ability to welcome and successfully train a wider range of students than it has traditionally served. Specifically, the College should expand representation of groups defined by SUNY as underrepresented (UR): Native Hawaiian or Other Pacific Islander, Black or African American, Hispanic/Latino, American Indian or Alaska Native, Underrepresented Multiracial, or women in STEM fields. Perhaps most central to the PhD Excellence Initiative is that there is ample evidence that diversity among graduate students improves the quality of doctoral education (Chang, M.J. et al. (2003) *The Compelling Interest: Examining the Evidence on Racial Dynamics in Colleges and Universities*. Redwood City, CA: Stanford University Press). Hence, Diversity is the third index to be included in the proposed algorithm.

To measure diversity, the Committee distinguished between (1) the effort a department is making to increase diversity and (2) the results. Diversity efforts are the work a department does to recruit and retain traditionally under-represented (UR) students. Diversity results are the percentage of UR applications, acceptances, enrollments, and graduations. The Committee’s metric weighs both effort and results to produce a single score, from zero to one, that reflects a department’s effort and success in increasing graduate student diversity. At the beginning of a ten-year period, this score will be 75% effort and 25% results; by the end of the period those proportions will shift to 25% effort and 75% results. This index will be calculated through the following process:

Effort

A Diversity Subcommittee of the standing PhD Excellence Oversight Committee, working with CAS Center for Diversity Innovation, UB's Office of Inclusive Excellence, or some other established center of diversity expertise at UB, will examine departmental efforts. Effort will be scored on a zero to one scale based on the presence or absence of "best practice" elements as documented in a diversity effort dossier provided to the committee (formula described below). A preliminary list of such elements, which will be further articulated by the Oversight Committee before the metric is applied, can be found in Appendix C.

Results

CAS already collects data about departmental diversity. The Diversity Subcommittee will use these data to calculate and annually update a numerical, zero to one score of recruitment results and graduation rates of UR students averaged over a five-year time window. At the beginning of the 10-year period, this score will be 75% recruitment results (% UR applications, % UR acceptances, and %UR enrollment) and 25% UR graduation rates; by the end of the period that weighting will be reversed, with 25% recruitment results, and 75% graduation rates. Diversity metrics will be compared against national averages per discipline, rather than CAS departments. For disciplines where a national average is not obtainable, the Committee will use national averages for all graduate programs (14% African American, 17% Latinx, as per https://nces.ed.gov/programs/digest/d16/tables/dt16_306.10.asp?current=yes).

Effort and results will be combined to compute a diversity index for the proposed algorithm. The details of how effort and results are combined into a diversity index can be found in Appendix C.

Time-to-Degree

Earning a PhD takes multiple years of course work, research, and writing, and the length of time to degree is a concern of many students, faculty, and administrators. Time is a limited resource, and there are high opportunity costs to PhD graduates who do not enter the workforce until their 30's. There is general consensus that earning a PhD takes too long in the United States, on average 8 years in the humanities and 6 years plus post-doctoral years in the sciences (Council of Graduate Schools Research Report on "*Time-to-Degree for Doctoral Recipients*", https://www.cgsnet.org/ckfinder/userfiles/files/DataSources_2010_03.pdf; Carnegie Mellon Foundation Report on "*Reforming Doctoral Education, 1990 to 2015 Recent Initiatives and Future Prospects*", <https://mellon.org/news-blog/articles/reforming-doctoral-education-1990-2015-recent-initiatives-and-future-prospects/>). A lengthy period to earn a doctoral degree does not serve most students well. Accordingly, time-to-degree is an important consideration. The average time-to-degree computed from an eight-year window of entering students for each department will serve as the fourth index to be included in the proposed algorithm.

The initial calculation of time to degree used by the Committee is provisional, as we recognize the potential value of indexing this variable in terms of national data for particular disciplines. For example, a given department may have an average time to degree that is at or clearly less than the national average for that discipline but still above the average for CAS departments. There was insufficient time for the Committee to fully consider the complexities of this issue or to collect normative data for each of the PhD granting departments in the College. The Committee strongly recommends that this issue be fully considered by the PhD Excellence Oversight Committee. Furthermore, the data available from the college includes leaves of absence years in the computation of

time-to-degree, and the committee believes that leave of absence years should not be included in this computation. Other circumstances, such as fellowships or international exchange programs, are extremely helpful to students but may lengthen time-to-degree. The Committee strongly recommends that these issues be fully considered by the future PhD Excellence Oversight Committee.

In working with the time-to-degree data, the committee observed that there were many students who have been enrolled for 8+ years but have not yet graduated. Over time, these students will either graduate or leave their program without a degree, and this will inflate either the time-to-degree or attrition index. These students are “hidden” in that they do not contribute to the algorithm, but eventually they will. Of concern is that these “hidden” students represent a fairly large percentage of students in some departments.

The Allocation Algorithm

We propose a mathematical approach to incorporate the four indices described above. Below we describe our proposed mathematical approach. In formulating the algorithm, we considered distribution of PhD support in the form of stipend funds (a dollar amount) versus student lines (numbers of CAS-supported PhD students). Distributing based on a dollar amount was rejected because it unfairly penalized departments that were previously funding students below the newly mandated funding levels. In short, these departments would take a larger hit in the number of funded students. We thus decided to distribute support in terms of student lines. For a given number of CAS-supported PhD students, distributing support in terms of student lines shifts stipend resources towards departments that previously had the lowest average PhD stipends.

We also considered potential redundancy in the four indices under consideration. We found that the three indices on which we currently have data (attrition, time-to-degree, and post-PhD outcomes) were not redundant (correlations ranging from -.19 to .29). This suggests that each index is providing unique information in the algorithm.

We propose that 10 graduate lines be withheld from the CAS pool for the standing committee to disburse to address special circumstances that might impact departments (e.g., to mitigate shrinkage in departments that are at critically low levels of PhD lines). We envision departments submitting a request for these “special circumstance” lines to the PhD Excellence Oversight Committee. If the PhD Excellence Oversight Committee were to find that not all “special circumstance” lines were used, they could be returned to the general pool for disbursement.

The proposed algorithm is grounded in the following equation:

$$\left(\frac{N_i}{\sum_i N_i}\right)_n = \left(\frac{N_i}{\sum_i N_i}\right)_{n-1} \left[1 + \left(\sum_j c_j \Delta_j\right)_i\right]$$

Indices in the equation are as follows:

i = department

n = year

j = metrics: outcomes, attrition, diversity, time-to-degree

Definitions of variables in the equation are as follows:

N_i = Number of CAS-supported PhD students in a given department

$\left(\frac{N_i}{\sum_i N_i}\right)$ = A given department’s fractional share of all CAS-supported PhD students

c_j = Coefficient weighting each metric

Δ_j = Indicator of change (positive or negative) in performance of a given department in a given year with respect to one of the four metrics above

$\sum_j c_j \Delta_j$ = Indicator of overall change in performance, which translates to a change in the department’s fractional share of PhD lines

The algorithm will be implemented as follows:

Step 1: Compute each department’s fractional share of PhD lines in previous year (minus 10 lines to be reserved for the Oversight Committee) (2018-19 in sample calculations):

$$\left(\frac{N_i}{\sum_i N_i}\right)_{n-1}$$

Step 2: Rank each department in performance with respect to indices:

- Outcomes ($c_{outcomes} = 0.3$)
- Attrition ($c_{attrition} = 0.25$)
- Diversity ($c_{diversity} = 0.25$)
- Time-to-degree ($c_{time-to-degree} = 0.2$)

Step 3: For each of the 4 metrics, sort departments into bins based on their relative standing.

Bin number	Percentile rank	Value of Δ_j
1	Top 20%	+0.2
2	Next 20%	+0.1
3	Middle 20%	0
4	Second-worst 20%	-0.1
5	Bottom 20%	-0.2

The departments in the top bin (top performing departments) for a given index realize a positive contribution ($\Delta_j = +0.1$) to the adjustment of lines, departments in the middle bin realize no change, and departments in the lower bins realize a decrease.

Step 4: Compute the adjusted fractional share of PhD lines for the subsequent year (n) for each department on the basis of performance with respect to the four metrics:

$$\left(\frac{N_i}{\sum_i N_i}\right)_n = \left(\frac{N_i}{\sum_i N_i}\right)_{n-1} \left[1 + \left(\sum_j c_j \Delta_j\right)_i\right]$$

Doing the math on right-hand side of equation generates a department’s fractional allocation of funds in a given year (*n*) as an adjustment relative to the fractional allocation from the prior year (*n-1*) on the basis of performance with respect to the four indices.

Sample calculation for a hypothetical department

- Department X’s fractional share of lines in 2018-2019:
 - College supported total of 400 PhD students
 - Department X had 12 CAS-supported PhD students (TA lines)
 - Department X’s fractional share = (12/400) = 0.030
- In 2018-2019, Department X ranked as follows:
 - Outcomes: Highest 20%, bin 1, Δoutcomes= +0.2
 - Attrition: Lowest 20%, bin 5, Δattrition= -0.2
 - Diversity: Middle 20%, bin 3, Δdiversity= 0
 - Time-to-degree: Highest 20%, bin 1, Δtime-to-degree= +0.2
- Factor by which Department X’s fractional share of lines adjusted:

$$\left(\frac{N_i}{\sum_i N_i}\right)_n = \left(\frac{N_i}{\sum_i N_i}\right)_{n-1} [1 + [(0.3 * 0.2) + (0.25 * -0.2) + (0.25 * 0) + (0.2 * 0.2)]] = \left(\frac{N_i}{\sum_i N_i}\right)_{n-1} * 1.05$$

- Department X’s fractional share of lines in subsequent year:

$$\left(\frac{N_i}{\sum_i N_i}\right)_n = 0.03 * 1.05 = 0.0315$$

- Department X’s number of CAS-supported PhD students (TA lines) in subsequent year, assuming that total number of CAS-supported PhD students is unchanged:
 - $N_i=0.0315 \times 400 = 12.6$
 - Fractional lines could be banked for subsequent years.

- **Restricted Growth:** We propose restricting growth in any department to a 15% increase relative to Year 0 (2018/2019). This will prevent unrestrained growth in departments that are continuously top performers and unrestrained draining of resources from lower performing departments. Once growth is restricted, the resources can be redirected to lower performing departments. We also considered restricting shrinkage of poorly performing departments (a lower guardrail). However, restricting both growth and shrinkage had the unintended effect of transferring resources from intermediately performing departments to the lower performing

departments. Hence, we opted for including restricted growth as this has the effect of transferring funds to both intermediately and lower performing departments.

Application of the Allocation Algorithm: The algorithm data from each department (including Attrition, Time-to-Degree, and PhD-Level Outcomes) and the application of the algorithm using these data are shown in Appendix D.

- **Other considerations:** We considered the issue that prior levels of funding may have negatively impacted departments with historically low levels of graduate funding. This was most apparent with respect to post-PhD outcomes with prior funding levels showing a positive association with successful post-PhD outcomes. Although it is tempting to interpret such an association as causal (more funding leads to better outcomes), we felt that this was a dubious assumption and that many things drive positive outcomes that likely overlap with levels of funding (e.g., discipline-wide differences in typical funding levels and post-PhD outcomes). Furthermore, adjusting the algorithm for prior funding levels hurts departments that either fund students on grants or provide top-offs to students with grant funding. Accordingly, this issue was not considered further.

The committee discussed at length the issue of evaluating departments against discipline-specific criteria. There are pros and cons to this approach. One perspective is that a department may have a very well-regarded graduate program relative to others in that discipline, but this may be obscured by using general criteria that cuts across disciplines. On the other hand, it may be harder to find PhD level positions in some disciplines than others, regardless of the quality of the program. The result may be that a graduate from a program well-regarded within the discipline may have few prospects for a PhD level position.⁹ Furthermore, there is concern about whether discipline specific data would be available for all departments and about the increased complexity in integrating such data into the allocation algorithm. These are issues that should be further considered by the future Oversight Committee

Recommendation 3: Create a standing PhD Excellence Oversight Committee

The PhD Excellence Bridge Committee recommends the creation of a standing PhD Excellence Oversight Committee in the College of Arts and Sciences.

Background and Rationale

⁹ There is an ongoing debate over the value of PhDs in fields in which there are relatively few academic or PhD-level positions available. Those fields may be reenergized in the future, providing new job placement opportunities. At the same time, it is important to acknowledge the importance of not over-producing PhDs who will be unable to find work that makes meaningful use of their education. This is one of the reasons the algorithm is designed in such a way that it can reduce the size of programs in which graduates have difficulty finding PhD-relevant positions but cannot eliminate those programs.

The Bridge Committee believes the success of the Funding Allocation Algorithm requires ongoing monitoring and dynamic adjustment of the formula. The Committee has projected the impact of the algorithm over multiple years using current departmental data and various combinations of algorithm parameters. We recognize this modeling is rudimentary and may not capture the real-world changes that will occur in departmental allocations over time. Consequently, the performance of the algorithm will have to be regularly inspected. The proposed weighting of the four indices may have to be adjusted to maximize positive impact on indicators of PhD excellence. Moreover, parameters affecting the performance of the algorithm may have to be altered. For example, year-to-year changes in funding allocation could be slowed or accelerated by adjustments in the size of the values assigned to performance bins calculated for each index, or in the frequency at which the algorithm is applied. The algorithm could also be altered by the addition of new indices reflective of PhD excellence.

Although the Funding Allocation Algorithm can identify PhD training programs that consistently underperform relative to other departments, it is not the intent of the Bridge Committee to have the algorithm used as a tool to disband the PhD program of any department. As part of the monitoring process, it will be critical to examine the ongoing and projected impact of the algorithm on departments with small numbers of PhD lines, particularly departments projected to have major reductions in their lines. Consequently, the algorithm can provide a signal of extant or emergent problems confronting a PhD program – a signal that should be used by the department and the College to generate remedial actions to promote excellence in the training program.

The PhD Excellence process also requires the ongoing collection of accurate data and expansion of data for inclusion in the algorithm. As an important example, future versions of the algorithm may include calculations of certain indices in comparison to the performance of peer institutions or a field as a whole. Those comparisons will be useful, in part, to the extent that the index is derived in exactly the same manner across institutions. At present, those data are not readily available for all disciplines and fields represented in CAS departments. Similarly, the Committee acknowledges the need for richer information on PhD outcomes, information collected over a longer period and accurately capturing the employment placements of all of our graduates. The ongoing collection of that data will require systematic monitoring and considerable and sustained effort.

The Committee recognizes there will be multiple special issues arising from departments requiring resolution. For example, the definition of successful PhD outcomes might be modified to include positions that are held by an overwhelming majority of people with PhDs. Those determinations should not be made by departments given the understandable biases to judge an outcome as successful. Similarly, unilateral decisions on those cases from the Dean's office are unlikely to be seen as fair or unbiased by departments. Moreover, decisions originating in the Dean's office might not be transparent and could be interpreted as a perpetuation of the previous ad hoc, unsystematic method of assigning PhD support to departments. Issues with other indices are likely to emerge.

There are several outstanding issues not fully settled by the Bridge Committee that require resolution. For example, the full version of the proposed algorithm requires the implementation of the diversity index. Importantly, a listing of best practices must be formalized and communicated to departments so they can deploy their diversity efforts as soon as possible.

Moreover, departments could be helped considerably if they could consult with people fully committed to the PhD Excellence process with expertise on the operation of the Allocation Algorithm.

This assistance would be particularly beneficial for departments projected to experience major declines in PhD lines and that want to develop coherent, systematic plans for altering their trajectory.

The Bridge Committee concluded that all the issues described above would be best managed through the creation of a standing committee of faculty tasked to oversee the PhD Excellence process in the College.

Composition of Oversight Committee

The PhD Excellence Bridge Committee recommends that the CAS Policy Committee establish a standing PhD Excellence Oversight Committee. The Committee should consist of ten members including eight CAS tenured and tenure track faculty, one member from the CAS Policy Committee, and one ex-officio representative of the Dean. The Committee should also include two nonvoting graduate student representatives. The Oversight Committee should be sufficiently staffed to support the duties of the committee. Faculty membership of the Committee should be determined by a vote supervised by the CAS Policy Committee with two faculty members elected from each of the major grouping of departments across the College as follows: Natural Sciences, Social Sciences, Humanities, and Arts. No department may have more than one member on the Committee. The Chair will be elected for a two-year term by the members of the committee with approval of the Policy Committee. Committee terms will be two years (renewable). Graduate student representatives should be determined by a vote of currently enrolled PhD students. No department may have more than one graduate student representative on the Committee. The Committee will meet at least monthly or more frequently depending on the issues that need to be addressed. Full minutes will be collected for each meeting, and the minutes will be distributed to CAS faculty. In addition, the Committee will prepare regular reports on Committee activities, which will be distributed to the faculty.

Major Duties of the Oversight Committee

- Monitoring, adjusting, and altering the Funding Allocation Algorithm
- Work with CDI, OIE, or some other established center of diversity expertise at UB to score departmental diversity efforts; update lists of best practices as necessary; and provide guidance to departments seeking to improve diversity efforts
- Assessing the impact of algorithm on departments
- Evaluating and improving index data
- Adjudicating special issues and petitions
- Consulting with departments on issues related to algorithm and PhD training
- Collecting and monitoring collection of peer departmental data
- Monitoring CAS's commitment to PhD training

Proposed Guidelines for Operation of Oversight Committee

Up to 10 PhD lines should be reserved for allocation by the PhD Excellence Oversight Committee to allow the Committee to deal promptly with urgent situations. These lines will not be available for instances in which departments receive an unexpectedly large incoming class but will be reserved to offset consequences of the algorithm in response to a direct request from a department. In employing the proposed rubric, we encourage the Oversight Committee to be sensitive to departments with smaller PhD allocations. For departments with a small number of doctoral students, fractional

TA-line increases or decreases can have a large impact on the program. Committee-controlled lines will not be sufficient to deal with all contingencies, and the Dean will be encouraged to contribute additional lines under exceptional circumstances. One situation that will require action by the Dean should be the provision of additional PhD lines for small departments to support diversity.

Ordinarily, faculty have no access to the processes that govern the distribution of TA lines to departments: those decisions are made by the Dean behind closed doors and are communicated privately to individual department chairs. Our hope is that this algorithm — in conjunction with the Oversight Committee — will make this process transparent, predictable, and responsive to faculty and student priorities and needs.

The Committee recommends that the Oversight Committee retain the commitment to the core principles that informed the work of the PhD Excellence Bridge Committee. These include the recognition that excellence in PhD training is a critical component of the University and College mission; decisions be guided by performance data that are accurate, complete, and collected over reasonable time spans; processes for distributing resources to departments are completely transparent and subject to ongoing monitoring and correction; and there be no blind adherence to the allocation algorithm with the understanding that special situations will arise that require adjustments.

The Bridge Committee recognizes the recommendations of the Oversight Committee would be advisory to the Dean. Nonetheless, there are sound reasons for expecting the Dean to follow the guidance of the Oversight Committee. Critically, the Oversight Committee would be versed in the relevant data and be best positioned to understand the implications of their decisions for promoting PhD Excellence.

Appendix A: PhD Excellence Bridge Committee – Recommendation for funding 2020 Graduate Admissions

Dear Colleagues,

The following recommendation was sent to Dean Schulze on Thursday November 15:

PhD Excellence Bridge Committee – Recommendation for funding 2020 Graduate Admissions

The PhD Excellence Bridge Committee has reviewed graduate recruitment options for fall 2020 PhD admissions. We understand this matter is of urgent concern, as departments need to move forward with their plans for graduate recruiting. **The Committee unanimously recommends that the College of Arts and Sciences and the University allocate TA funds for 2020-21 that allow departments to offer the same level of admissions as would have been expected prior to the funding changes implemented by the PhD Excellence Initiative.** The context and rationale for this recommendation are as follows:

The decision at the university level to increase PhD student stipends to a minimum of \$20,000 annually and to transfer those increased costs to the College generated a structural deficit in College finances. Absent other sources of money, the number of state-supported PhD students would have to be cut to balance the College's budget. The Provost provided some additional funding to mitigate the shortfall, but this money only covers the increases for current students for three years (100% in year 1, 100% in year 2, and 50% in year 3) and does not cover student fees (estimated to be \$1.67 million across the three years). Consequently, the long-term budget problem is delayed but not eliminated. The bridge funds from the Provost provide no funds for a new graduate cohort to be recruited for fall 2020.

The Bridge Committee was formed to determine how resources for TAs and RAs would be distributed across the College for fall 2020 and beyond. The Committee confronted two issues. The first was what to do about the upcoming recruitment season. The second was to formulate a systematic plan for the allocation of PhD funding across the College; a plan that would change the distributions of money to departments in line with the goals of the university-wide PhD Excellence Initiative. This plan would reflect detailed information from departments about graduate training and outcomes and would also consider financial information about College operations.

The first issue, formulating a recommendation for 2020 graduate recruitment, has occupied most of the Committee's attention. Given the urgency of the situation, we recognized that decisions about allocation of money could not be conditioned on any of the factors that will inform the development of a comprehensive PhD Excellence plan. The Committee reviewed multiyear financial projections for several funding scenarios. These scenarios modeled the impact of funding departments with sustained reductions in new admissions (relative to 2019 admission numbers) of 0, 5, 10, and 25% through 2022. (That time period corresponded to the duration of bridge funding from the Provost.) Of the models we examined, only a 25% reduction resulted in a balanced budget by 2022.

As the Committee examined these models and contemplated the potential impact of across-the-board cuts in graduate admissions, several significant problems became evident. The modeling was based on multiple assumptions that, given the limited time to assemble the data, could not be validated. Moreover, the 100% bridge funding from the Provost (for 2019 and 2020) fell short of the budget gap created by the University's decision to increase stipends and fully cover student fees. That is, the bridge funding was not truly 100% and provided no funds for recruitment of a new graduate cohort in fall 2020. Also, because of time constraints, the

budget deliberations did not include any consideration of the overall budget situation of the College. Consequently, alternative sources of funding for our graduate programs could not be included in the modeling.

Beyond the vagaries of the modeling, the immediate and long-term implications of instituting an across-the-board cut were unclear and likely biased. For example, a 25% cut in admissions, even for a year, would have an unbalanced impact across departments and work against the goal of promoting PhD excellence in the College. Relatedly, an across-the-board cut would be inconsistent with the Committee's commitment to develop a comprehensive plan to allocate money differentially across departments in full consideration of graduate training, graduate outcomes, and College resources. We also want substantial faculty and student input as we develop a plan. We intend to create a mindful plan – across-the-board cuts are mindless.

The Committee understands the budget implications of maintaining departmental allocations of PhD funding at current levels for an additional year. A one-size cuts all approach to the problem, which appears to be the only immediate-term option available to the committee, is a makeshift and likely harmful solution. A reasoned, justified plan for reconfiguring PhD training in the College will take time, more time than the few weeks available between the announcement of the graduate stipend increase and the beginning of the 2020 graduate recruitment season.

Recently, the University of Chicago adopted a plan to reform its PhD programs motivated by educational goals nearly identical to those advocated by UB's Graduate Excellence Initiative. The plan formulated at the University of Chicago was preceded by more than 80 committee and subcommittee meetings conducted over the course of a year. The components of the plan, including the financial elements, were implemented after the plan was fully developed, not before. The situation at UB reflects a reverse dynamic: the financial portions of the Graduate Excellence Initiative were put in place prior to the creation of a plan. Though we do not wish to relitigate what we see as the mistakes of the past, we do not want to repeat those mistakes. Consequently, the PhD Excellence Bridge Committee strongly supports stable funding of the College's PhD programs based on 2019 funding levels while the Committee tackles the complex issues of reconfiguring and strengthening our doctoral programs. This funding should include a true bridge fund. That is, in addition to the 2 ½ years of funding to cover increases for current students, the bridge funds should also cover five years of funding for a PhD graduate cohort admitted in 2020.

Members of the PhD Excellence Bridge Committee

Rachel Ablow (English)

Michelle Benson (Political Science)

Craig Colder (Psychology)

Jonathan Golove (Music)

R. J. Haq (Grad Student)

David Herzberg (History)

Laura Rusche (Biology)

Stephen Tiffany (Psychology) Committee Chair

David Watson (Chemistry)

Krzysztof Ziarek (Comparative Literature)

Appendix B: Positions Added by Dean Schulze¹⁰

- Associate Dean for International Education and Enrollment (faculty)
- Director of Diversity Innovation
- Senior Staff Assistant to the Director
- Director, Arts Collaboratory
- Director, Sustainability Initiative
- Associate Dean for Special Programs (faculty)
- Director of Online Learning
- 2 Graduate Enrollment Coordinators
- Administrative Assistant
- Director of Facilities and Space
- Associate Dean/Senior Staff Associate
- Staff Assistant
- Humanities Director
- Director of the Strategic Initiative for Digital Humanities
- Associate Dean for Inclusive Excellence
- 2 Assistant Directors of Community Relations [moved from the CFA]¹¹

¹⁰ Please note that there may be some inaccuracies in this list as a result of missing or erroneous data.

¹¹ Due to time constraints we were unable to establish whether these constitute new hires. The CFA is run by the College, but we were given no data on its staffing.

Appendix C: Computation of a Diversity Index**List of Preliminary Elements for Computing Effort Score**

- **Public facing support for diversity (0-10 points; BUT: a prerequisite for any other pts)**
 - Appropriate diversity mission statement featured prominently on departmental website
 - Links to campus resources displayed on department website (e.g., OIX, Intercultural and Diversity Center, Center for Diversity Innovation, relevant student groups)
- **Recruitment (0-30 points)**
 - Clearly articulated recruitment strategy (e.g., see https://www.rackham.umich.edu/downloads/Circle_of_Recruitment_Toolkit.pdf or [https://ls.berkeley.edu/sites/default/files/guide to recruiting and retaining diverse graduate students at ucberkeley.pdf](https://ls.berkeley.edu/sites/default/files/guide_to_recruiting_and_retaining_diverse_graduate_students_at_ucberkeley.pdf))
 - *Develop ties to “feeder” schools based on past dept history of UR students*
 - *E.g., cross-departmental, grad/undergrad student research conference & open house w/ faculty participation, held in conjunction w/ a “feeder” school,*
 - *Other recognized “best practice”*
- **Admissions (0-30 points)**
 - Holistic admissions (<https://rackham.umich.edu/faculty-and-staff/resources-for-directors/holistic-review-of-applications/>)
 - Use of graduate funding resources to maximize recruitment of UR students, including, e.g., dedicated UR funding including but not limited to Schomburg fellowships
 - *Other recognized “best practice”*
- **Retention (0-30 points)**
 - Dedicated departmental officer (staff or faculty) for UR student issues
 - Clearly articulated retention strategy (e.g., https://www.rackham.umich.edu/downloads/Circle_of_Recruitment_Toolkit.pdf or [https://ls.berkeley.edu/sites/default/files/guide to recruiting and retaining diverse graduate students at ucberkeley.pdf](https://ls.berkeley.edu/sites/default/files/guide_to_recruiting_and_retaining_diverse_graduate_students_at_ucberkeley.pdf))
 - *Other recognized “best practice”*

Appendix C continued

Equation to Combine Effort and Results to Compute a Diversity Index for Each Department

DIVERSITY EFFORT (DE) + DIVERSITY RESULTS (DR) = DIVERSITY SCORE (DS)

DE starts out weighted 75% in year 1, and declines to 25% by year 10

DR starts out weighted 25% in year 1, and rises to 75% by year 10

Thus, the equation would be:

$DE*(0.75-0.05*N) + DR*(0.25+0.05*N) = \text{Diversity score (0-1 scale)}$, where N represents the year (starting at 0)

However, we also need to break down DR into two components (Diversity recruitment results, DRR, and diversity graduation rates, DGR) over ten years:

- Diversity Recruitment Results (DRR; application, acceptances, and enrollment percentages) start at 75% of the score and fall to 25% by year 10
- Diversity Graduation Rates (DGR) start at 25% and rise to 75% of the score by year 10
- Thus, the expanded equation (w/ N = year, starting at year zero) for diversity score on a scale from 0-1:

$$DS = DE*(0.75-0.05*N) + [DRR*(0.75-0.5*N) + DGR*(0.25+0.5*N)]*(0.25+0.05*N)$$

Example calculation, Year 0:

- **DIVERSITY EFFORT:**
Department A has a diversity statement (10 pts); a formally adopted UR recruitment plan but no connection built to a “feeder” school or other similar effort (15 pts); has incorporated aspects of holistic admissions (20 pts); and has appointed a faculty diversity officer who has attended diversity training and whose position has formally defined responsibilities (25 pts). Diversity effort score is 0.7 out of 1.
- **DIVERSITY RESULTS:**
Department A’s percentage of applicants who are UR is 80% of national disciplinary average; its percentage of UR acceptances is 75% of non-UR acceptances; its percentage of UR enrollment is 75% of acceptances; its percentage of URs accepted who graduate is 85%. Diversity results score will depend on the year; in year zero, it will be $((0.8+0.75+0.75)/3)*0.75 + (0.85*0.25) = 0.575 + 0.2125 = 0.7875$ out of 1.
- Department A’s total diversity score in year zero would be $(0.7 * 0.75) + (0.7875 * 0.25) = 0.72$

Corresponding example calculation, Year 5:

- If Department A’s metrics with respect to Diversity Effort and Results were unchanged, in year five its total diversity score would be calculated as follows:

$$DS = (0.7*0.5) + [(0.77*0.5) + (0.85*0.5)]*0.5 = 0.35 + (0.383 + 0.425)*0.5 = 0.35 + 0.404 = 0.75$$

Appendix D: Application of Allocation Algorithm to Departments

Algorithm:
$$\left(\frac{N_i}{\sum_i N_i}\right)_n = \left(\frac{N_i}{\sum_i N_i}\right)_{n-1} \left[1 + \left(\sum_j c_j \Delta_j\right)_i \right]$$

Data:

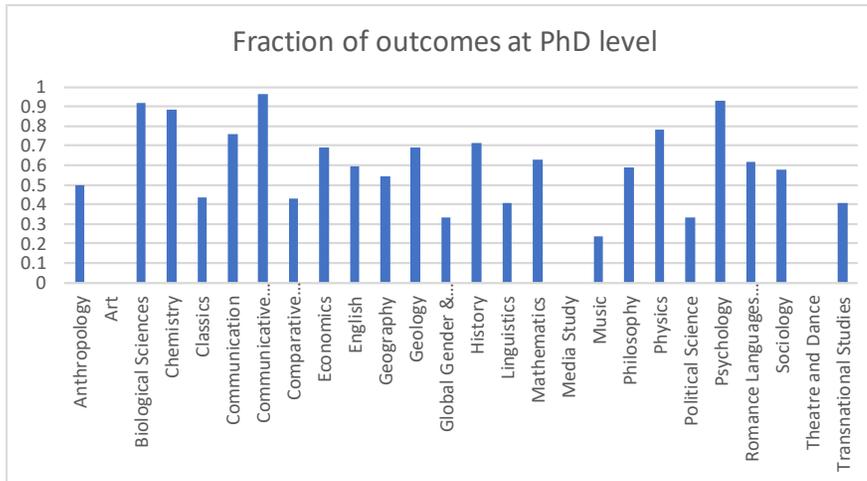
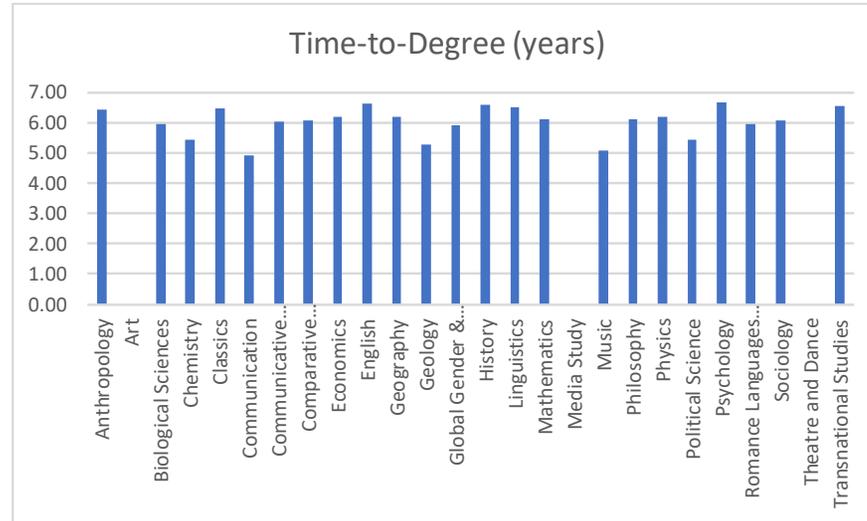
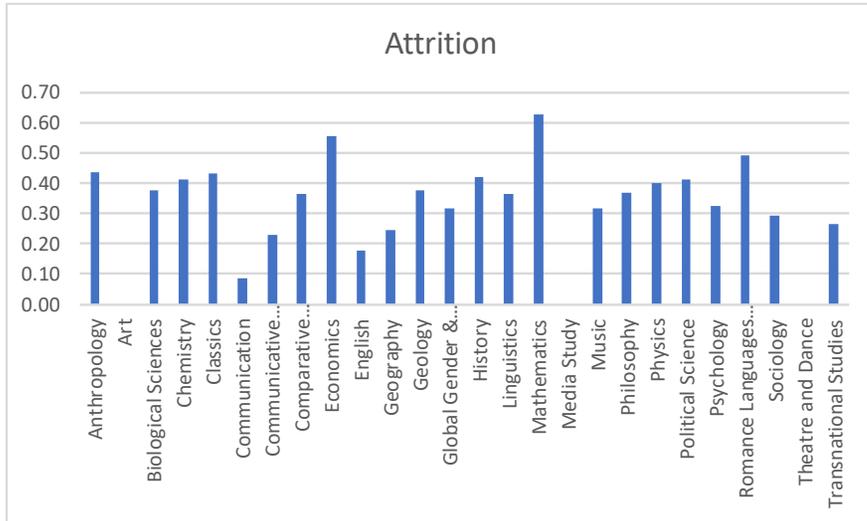
Department	$\left(\frac{N_i}{\sum_i N_i}\right)$ 2018-19	Attrition ($c_j = 0.25$)				Time-to-Degree ($c_j = 0.2$)				PhD-level Outcomes ($c_j = 0.3$)				Diversity ($c_j = 0.25$)	$1 + \left(\sum_j c_j \Delta_j\right)$	$\left(\frac{N_i}{\sum_i N_i}\right)$ 2021-22 preliminary calc.
		Value (%)	Rank	Bin # ^b	$c_j \Delta_j$ attrition	Value (yrs.)	Rank	Bin # ^b	$c_j \Delta_j$ TTD	Value (frac.)	Rank	Bin # ^b	$c_j \Delta_j$ outcome	$c_j \Delta_j$ diversity placeholder ^c		
Anthropology	0.032	0.44	20	5	-0.050	6.42	17	4	-0.02	0.500	16	4	-0.03	0	0.900	0.029
Art ^a	0.009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Biological Sciences	0.057	0.38	14	4	-0.025	5.95	7	2	0.02	0.917	3	1	0.06	0	1.055	0.061
Chemistry	0.151	0.41	17	4	-0.025	5.42	5	2	0.02	0.887	4	1	0.06	0	1.055	0.159
Classics	0.028	0.43	19	5	-0.050	6.46	18	4	-0.02	0.438	17	4	-0.03	0	0.900	0.025
Communication	0.022	0.09	1	1	0.050	4.92	1	1	0.04	0.760	6	2	0.03	0	1.120	0.025
Communicative Disorders and Sciences	0.013	0.23	3	1	0.050	6.03	9	2	0.02	0.966	1	1	0.06	0	1.130	0.015
Comparative Literature	0.019	0.36	10	3	0.000	6.07	11	3	0.00	0.429	18	4	-0.03	0	0.970	0.018
Economics	0.035	0.56	22	5	-0.050	6.18	14	4	-0.02	0.692	8	2	0.03	0	0.960	0.034
English	0.116	0.18	2	1	0.050	6.65	22	5	-0.04	0.597	12	3	0.00	0	1.010	0.117
Geography	0.021	0.24	4	1	0.050	6.18	15	4	-0.02	0.545	15	4	-0.03	0	1.000	0.021
Geology	0.019	0.38	13	3	0.000	5.29	3	1	0.04	0.692	8	2	0.03	0	1.070	0.020
Global Gender & Sexuality Studies	0.009	0.32	8	2	0.025	5.90	6	2	0.02	0.333	21	5	-0.06	0	0.985	0.009
History	0.034	0.42	18	4	-0.025	6.59	21	5	-0.04	0.714	7	2	0.03	0	0.965	0.032
Linguistics	0.031	0.37	11	3	0.000	6.50	19	5	-0.04	0.409	19	5	-0.06	0	0.900	0.028
Mathematics	0.086	0.63	23	5	-0.050	6.10	12	3	0.00	0.630	10	3	0.00	0	0.950	0.081
Media Study ^a	0.019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Music	0.021	0.31	7	2	0.025	5.08	2	1	0.04	0.238	23	5	-0.06	0	1.005	0.021
Philosophy	0.030	0.37	12	3	0.000	6.13	13	3	0.00	0.586	13	3	0.00	0	1.000	0.030
Physics	0.076	0.40	15	4	-0.025	6.20	16	4	-0.02	0.780	5	2	0.03	0	0.985	0.075
Political Science	0.023	0.41	16	4	-0.025	5.42	4	1	0.04	0.333	21	5	-0.06	0	0.955	0.022
Psychology	0.064	0.32	9	2	0.025	6.67	23	5	-0.04	0.932	2	1	0.06	0	1.045	0.067
Romance Languages and Literatures	0.037	0.49	21	5	-0.050	5.95	8	2	0.02	0.619	11	3	0.00	0	0.970	0.035
Sociology	0.023	0.29	6	2	0.025	6.07	10	3	0.00	0.576	14	4	-0.03	0	0.995	0.022
Theatre and Dance ^a	0.008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transnational Studies	0.017	0.27	5	2	0.025	6.54	20	5	-0.04	0.406	20	5	-0.06	0	0.925	0.016

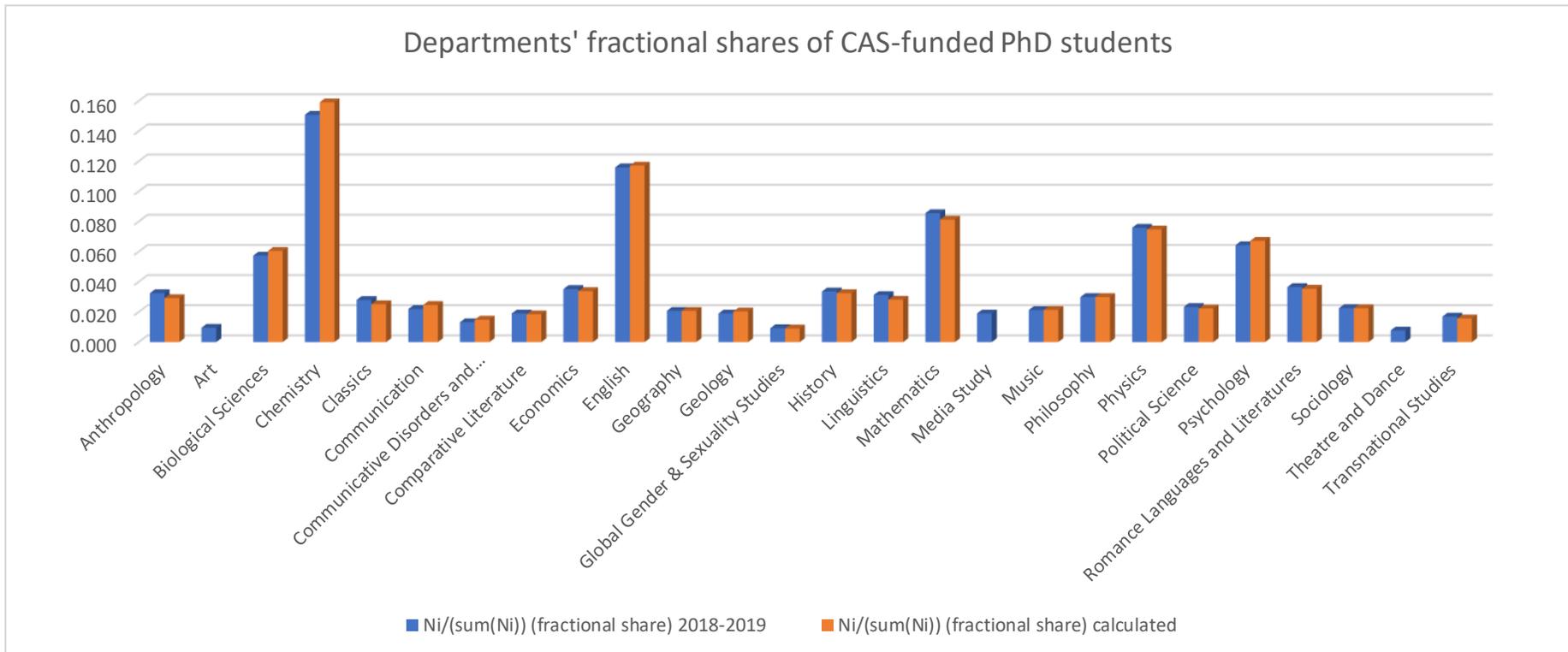
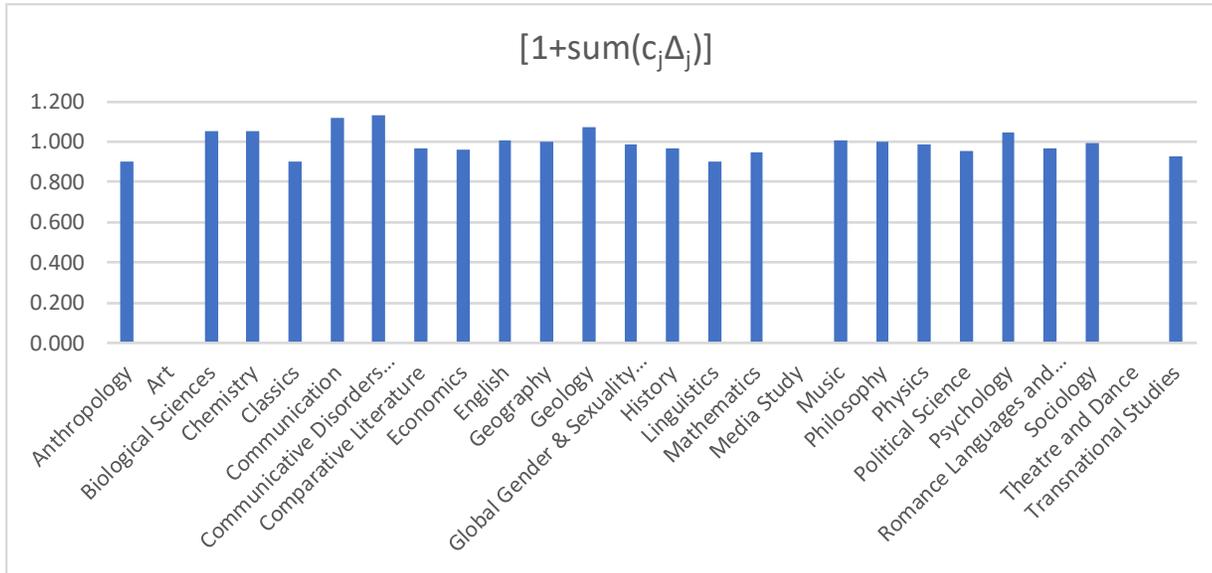
^a These departments have too few PhD students (entering 2005-2011) and/or too few graduates to warrant inclusion in the algorithm at this stage.

^b Increments for bins = +/- 0.1

^c Data on diversity were unavailable when this report was disseminated; thus, all departments are assigned to bin 3 with $\Delta_j = 0$.

Graphs:





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