

Future of Biology 2: Advancing Diversity, Equity, Inclusion and Belonging in the Life Sciences

Executive Summary

The Call to Action

As an academic community, we must make interventions to remedy systemic racism and inequality and to foster the expansion of diversity, belonging and inclusion. This call to action is codified at the system-wide level by UC Policy 4400,¹ which mandates the populations of UC reflect the diversity of the State. On the Berkeley Campus, we must uphold our Principles of Community² which affirm “the intrinsic relationship between diversity and excellence in all our endeavors”; our embrace of “open and equitable access to opportunities for learning and development as our obligation and goal” and “the dignity of all individuals and strive to uphold a just community in which discrimination and hate are not tolerated.”

As discussed in the report, we see slow but promising improvement to reflect the diversity of the population of the State in the life sciences student and faculty populations. Figures 1.a & 1.b below provide a snapshot of underrepresented minoritized groups³ (URM), and gender representation in our current faculty and student populations. Here we see a significant gap in faculty in both URM and gender representation and, while student populations show a more positive gender representation, student URM representation continues to be far behind State levels.

Fig 1.a. %URM by Population, Life Science Depts* (20-21)

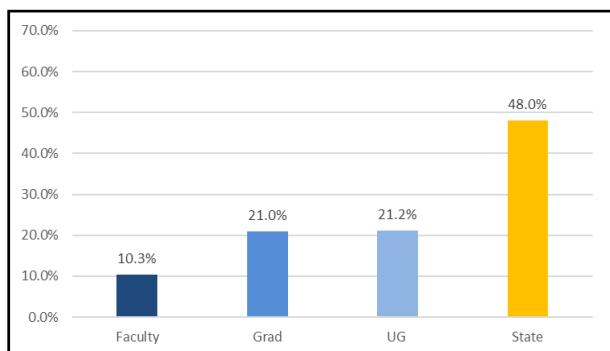
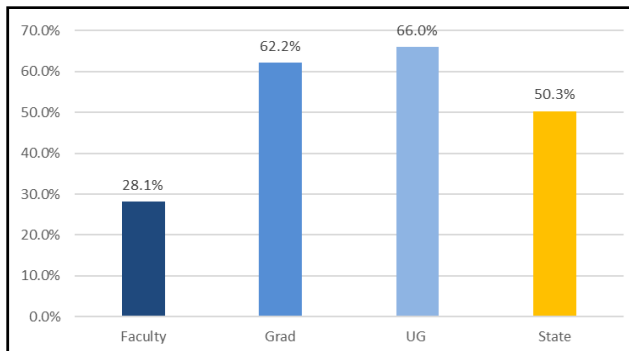


Fig 1.b. % Women by Population, Life Science Depts* (20-21)



* Departments: Bioengineering , Chem & Biomolecular Eng , Env Sci, Policy, & Mgmt , Integrative Biology , L&S Public Health , Molecular & Cell Biology , Nutritional Sciences & Tox , Other Bio Sciences Pgms , Plant & Microbial Biology , Ag & Env Chem Grad Grp , Bioengineering-UCSF Grad Grp , Biophysics Grad Grp , Biostatistics Grad Grp , Comparative Biochem Grad Grp , Computational Biology Grad Grp , Epidemiology Grad Grp , Health & Medical Sci Grad Grp , Infectious Diseases & Immun GG , Metabolic Biology Grad Grp , Microbiology Grad Grp , Molecular Toxicology Grad Grp , Neuroscience Graduate Program , Public Health. Source: Student Data, Cal Answers Census by Multi Field Report, Fall 2021; Faculty Data, OFEW 2021 Faculty Benchmarks reports for BioSci, CoC, CoE, RCNR, SPH. State data,

In addition, the recent My Experience climate survey results for our campus as a whole, and for individual biological sciences departments/programs, indicate that there is much work to be done to foster belonging and inclusivity on our campus⁴.

We recognize that our campus, as a whole, is engaged in a good amount of DEIB forward activity. Each academic department includes a strategic plan for DEIB in the academic review process. Most colleges have appointed an

¹ <https://regents.universityofcalifornia.edu/governance/policies/4400.html>

² <https://diversity.berkeley.edu/principles-community>

³ In campus reports, ethnicities included in URM are African American, Chicano/Latino, Native American/Alaska Native and Pacific Islander

⁴ <https://news.berkeley.edu/2021/02/25/berkeley-survey-campus-climate-overall-is-positive-but-marginalized-still-feel-excluded/>

associate dean for DEIB and launched equity and inclusion initiatives. At the campus level, the Office for Faculty Equity and Welfare continues to be a strong force for advancing DEIB for faculty. In the student arena, the Division of Equity and Inclusion sponsors several programs and initiatives and both the Graduate and Undergraduate Divisions are engaged in work to benefit all of campus. In our investigations as a committee, however, it has become clear that much of this work exists in silos, either organizationally by unit or by functional areas. By crossing these boundaries, we have greater opportunity to learn from each other, to foster best practices and spark new ideas. We believe that developing and coordinating these efforts as a life science community, we will advance a culture shift wherein the principles of diversity, equity, inclusion, and belonging are fully integrated into all that we do.

A plan for a common DEIB strategy across the Life Sciences is furthermore timely. In addition to simply being way overdue, and in anticipation of Berkeley becoming a Hispanic Serving Institution⁵ by 2027, the call for change is made even more urgent by the impact of the COVID pandemic. The pandemic has had a devastating financial impact on the university and its students. Current data⁶ show that 34% of undergraduates report food insecurity and 26% report housing insecurity with slightly lower, but similar numbers for graduate students. These impacts are much greater for URM, for example more than 50% of Black, Latinx, and Native American students reporting food insecurity. Students who experience housing and food insecurity have lower GPAs, lower graduation rates, and for graduate students, take longer to graduate, thus this problem directly impacts any remedies we propose here. These problems will only be solved if there is a financial plan to address these issues.

Background

The Future of Biology 2 (FOB2) Steering Committee was convened in August 2020 with a charge to “consider effective interventions and programs, to investigate areas for growth and development, and to make recommendations for concrete action” and “to develop recommendations that help guide the planning and development of diversity, equity, inclusion, and belonging (DEIB) initiatives across the life sciences, at the departmental, college and campus level.”

The Committee was led by Co-Chairs Diana Bautista and Tyrone B. Hayes. Committee members represented biological sciences departments from across campus: Greg Aponte, Stephanie Carlson, and Arash Komeili (Rausser College of Natural Resources), Diana Bautista, Gian Garriga, and Tyrone B. Hayes (Biological Sciences Division the College of Letters and Sciences), Michelle Chang (College of Chemistry), Sanjay Kumar (College of Engineering), and Eva Harris (School of Public Health). The Committee met 20+ times in a variety of formats and considered its charge from a variety of perspectives including the review of the diversity, equity, and inclusion strategic plans for the participating departments, analysis of campus data and reports, and review of external efforts and publications. The full committee also met with campus subject matter experts to develop a greater understanding of campus efforts and best practices.

The members of the committee brought diverse perspectives and priorities to this work, informed by their personal and professional experiences, and their home department cultures. Several committee meetings were

⁵ <https://hsi.berkeley.edu/>

⁶ <https://drive.google.com/file/d/1euiZEsAUD47zw1kgnY3M7isRZz5MFRVz/view>

used to discuss and define the common principles for the committee. **This resulted in the following Vision Statement:**

Diversity, equity, and inclusion will be integrated within the core of our educational and research endeavors, rather than segmented to the work of a single committee or subgroup. Continued excellence in the Life Sciences at Berkeley must put advancing diversity, equity, and inclusion up front in all areas.

The Future of Biology 2 Report

In the Future of Biology 2 Report, we endeavor to meet our charge in three parts addressing undergraduate students, graduate students, and faculty; we consider impediments to DEIB and offer recommendations for advancement in each section. A summary of our recommendations is included in the attachment. High-priority recommendations from our report are also included below, chosen either for their high potential for positive impact or no/low cost implementation.

Provide new or expanded bridge programs: Offer summer or first semester programs to bolster math, physics, chemistry, and biology skills for incoming undergraduate students. Develop and offer a bridge program for incoming life sciences graduate students to enhance research skills and build community. Offer free enrollment, stipends, and housing support to facilitate participation.

Reimagining courses in the life sciences: Review and revamp life science curriculums to be more inclusive and anti-racist. Provide/require faculty training to develop inclusive course materials. Use discovery-based approaches to engage students and foster scientist identities with a focus on small group work in designing experiments or solving problems and/or special experimental or field sections.

Provide instructor training at all levels: There are many platforms available to train faculty, lecturers and GSIs on techniques to make their courses more inclusive and develop more discovery-based material. These include FLOSS⁷, Discovery, and the National Science Foundation's Transforming STEM Teaching Faculty Learning Program (FLP).

iBIO Graduate Student Network: Foster the development of a graduate student-led organization that works across the biological sciences to promote a supportive climate for trainees.

Faculty Mentor training: Offer life sciences-wide ongoing training program where faculty develop skills for building inclusive, productive, culturally responsive, research mentoring relationships such as *Creating Inclusive Classrooms* and the *Exploring Unconscious Bias* workshops offered by the Multicultural Education Program. Encourage completion of the Multicultural Education Program Certificate series to enhance learning and exploration of equity and inclusion.

Standardize DEIB forward recruiting practices: For graduate students, use standardized evaluation rubrics for applicant assessment. For faculty, require DEIB statements in all searches and assess DEIB throughout the search process, including as selection criteria when evaluating application. Request and conduct faculty searches at the broadest level and encourage pool/cluster recruitments. Include an Equity Liaison as a full voting member of the committee, appointed by the Equity Advisor. Convene a working group to establish a standardized toolkit of resources for all life science search committees.

⁷ FLOSS: Faculty Learning Opportunities for Student Success <https://sites.google.com/berkeley.edu/floss>

Investigate and advocate for alternative methods of FTE allocation to better support innovative faculty searches.

Support new and junior faculty success: Support and expand Faculty Link and develop new faculty onboarding/development programs to create networks, success, belonging, and build skills in inclusive teaching and mentorship, grant writing, time management etc. Provide clear teaching and service expectations. Fund new faculty participation in the NCFDD Faculty Success Program one time before their midcareer review; provide funding for newly tenured faculty to participate in the Pathfinders program. Consider implementation of committee-based faculty mentorship programs such as LAUNCH.

Invest in housing and family support for early career faculty: Develop a more proactive and supportive campus response to the challenging housing market and child care needs of new faculty. Strengthen and improve partner support mechanisms.

Invest in more robust assessment and reporting for DEIB in the life sciences: Unified programmatic assessment of DEIB forward activities, and clear and consistent data collection and reporting will support our ability to make evidence-based decisions internally. Communicating a consistent and accurate data landscape for training grant applications which often rely on these points.

Conclusions

The work of this committee proved to be a colossal undertaking, and while we have put great effort into our report, it is only a start. More robust data analysis is needed to provide a clearer understanding of DEIB in the life sciences, namely to assess our current state and measure the effectiveness of interventions we employ to advance it. Furthermore, many of our recommendations require additional development and resources to implement. Advancing DEIB is important work and creating the critical mass needed is more than we can tackle as a committee, or indeed, than can be shouldered by individuals, separate departments and programs. To this end, in addition to the priority recommendations above, we recommend the establishment of a Life Sciences DEIB Collegium as described in the attachment below.

It also must be made clear that without a commitment of financial support from the campus, we are unlikely to make the level of change needed to truly advance DEIB in the life sciences. Berkeley should be the home for innovation in DEIB. But it cannot rest on individual faculty members or departments to move the needle. The campus must invest in the funding and leadership support we need to see these changes through. Our efforts to advance DEIB must be a top priority for campus, become an ongoing, coordinated effort and one that is pushed to be incorporated into all areas teaching, research and service.

Attachment: Summary of Recommendations

Attachment: Summary of Recommendations from the Future of Biology 2 Report.

(Priority recommendations marked with *)

Overall Recommendations:

Invest in more robust assessment and reporting for DEIB in the life sciences: The work of this committee proved to be a colossal undertaking, and while we have put great effort into this report, it is only a start. More robust data analysis is needed to provide a clearer picture of the current state of DEIB in the life sciences and to assess and measure the effectiveness of interventions to advance it. At the campus or decanal level, we must invest in an office of assessment and reporting on DEIB. Unified programmatic assessment of DEIB forward activities, and clear and consistent data collection and reporting will support our ability to make evidence-based decisions internally. Communicating consistent and accurate data will not only aid decision making but support grant funding efforts which often rely on these points.

Life Sciences DEIB Collegium: To ensure that advancing DEIB in the life sciences is ongoing and vitally incorporated in all areas, we propose the establishment of a collegium modeled on the Berkeley Collegium focused on innovation and excellence in undergraduate teaching.⁸ Members of the Collegium should include associate deans for DEIB from STEM colleges, senior staff members from E&I and OFEW and other subject matter experts. Faculty participation should be recognized with service or teaching relief, or a stipend to offset the additional work. Additionally, administrative staff support and program funding should be allocated by the campus and participating decanal units. Such a collegium should be charged with developing and promoting efforts to advance diversity, equity, inclusion and belonging in the life sciences. The Collegium should serve as an advisory council on DEIB to departments and individual faculty seeking to develop new programs or improve existing ones as well as a forum for developing and sharing innovations and resources. The Collegium should be empowered to dig deeply into data and report to identify areas for additional intervention. Ideally, it would also formally recognize outstanding efforts to advance DEIB, perhaps through an annual award. Additionally, the Collegium should be responsible for an annual symposium on advancing DEIB in the life sciences and promoting continuous discussion. We strongly recommend that the campus institute a Life Sciences DEIB Collegium in the 2023-2024 academic year and support it indefinitely. Such a permanent, standing body will help unite current efforts at the departmental, college and campus levels and push forward with the critical mass necessary for true culture change.

Recommendations at the Undergraduate Level:

Development and strengthening of the Coalition for Excellence and Diversity in STEM: Diversity, equity and inclusion programs in STEM be included and coordinated through the newly proposed Coalition for Excellence and Diversity in STEM. The benefits of this effort include coordinated fund-raising, administrative coordination between programs, and a hub for assisting students and helping them find these resources.

Improve undergraduate research opportunities: Develop and support scholarship/fellowship programs and other ways to fund students so that they can participate. Develop a program that will fund undergraduates from across departments to obtain paid research positions in labs, freshmen and transfer students should be targets.

⁸ <https://ue.berkeley.edu/committees/berkeley-collegium>

Support development of student community groups. Support efforts to unite, strengthen and expand existing programs.

***Develop “on-ramping, Entryway, or Bridge programs”:** Free enrollment summer or first semester program to bolster math, physics, chemistry, and biology skills for incoming students.

Offer new “Welcome to the Life Sciences” Course This survey course will introduce students to all 11 Life Science departments. The course will have no prerequisites and be targeted to Freshman and transfer students who intend to major in the Life Sciences and provide a pathway to research mentorship.

***Re-imagining courses in the life sciences** Review and revamp curriculum to be more inclusive and anti-racist. Provide faculty training to develop inclusive course materials. Use discovery-based approaches to engage students and foster scientist identities. Students can be asked to work in small groups to design experiments or solve problems. Some courses may also offer special experimental or field sections for students.

***Provide instructor training at all levels:** There are many platforms available to train faculty, lecturers and GSIs on techniques to make their courses more inclusive and develop more discovery-based material. These include FLOSS, Discovery, and the National Science Foundation’s Transforming STEM Teaching Faculty Learning Program (FLP).

Recommendations at the Graduate Student Level

Coordinate Organized Recruitment Efforts Across Biosciences: Joint outreach and recruitment efforts at national/regional conferences benefit all departments by sharing costs and efforts and leading students to departments that may be of their interests. This will additionally support community/cohort cohesion across departments for students of color, first generation, and low-income graduate students.

Expand Recruitment Efforts: Cultivate new relationships, and enhance existing relationships, with research and teaching faculty at institutions outside of traditional training grounds. Establish impactful relationships: provide virtual and in-person training for students in these schools by organizing workshops and bootcamps to help students prepare their graduate school applications and for the interview process. Increase transparency: present information about life during and after graduate school, highlighting the diverse career paths of our PhD alumni to attract a broader base of students. Create an online website listing all our programs to make it easier for students. Connect our graduate students who are from CSUs or HBCUs with the students that we meet with during our visits in order to establish affinity-based peer-mentoring.

Standardizing the application review process: Use holistic review process and rubric for graduate admissions (such as MCB, ESPM, PMB).

***iBIO Graduate Student Network:** Foster the development of a graduate student-led organization that works across the biological sciences to promote a supportive climate for trainees.

Inclusive Mentoring Training: Across campus, faculty should receive evidence-based mentor training every semester to enhance academic outcomes and foster a safe and inclusive training environment. We propose that ongoing training topics and workshops be organized by the Life Sciences consortium.

***Summer bridging program:** Develop and offer a bridge program for incoming graduate students to enhance research skills. Offer stipend and housing support.

Community-building and one-on-one advising: Develop a first-year program for trainees including a weekly discussion group to build community and share the journey while also being reassured and affirmed that they have what it takes to become a great scientist. Institute one-on-one advising sessions for trainees with faculty and staff once a month in their first and second years, and twice yearly thereafter.

Peer mentoring Network: Establish a peer mentoring system. Each trainee will be partnered with a senior peer mentor via affinity-based matching, upon arrival on campus in the summer of their first year. Fellows and their mentors will participate in monthly social events throughout graduate school (e.g., ice cream socials, Tilden Park hikes, Berkeley Botanical Garden tour, pizza and movie nights).

Justice, Equity, Diversity and Inclusion (JEDI) Seminars: Institute trainee-hosted Science and Diversity Seminar Series to host four seminars a year. Speakers will be investigators who are leaders both in their scientific field and also in diversity, equity and inclusion efforts at their universities and/or at a national level.

Sense of belonging workshop: Offer 1st Year Biosciences trainees a workshop based on strategies with proven success rates in studies of retention for students from under-represented groups in academic programs on confidence, identity, and sense of belonging, including imposter syndrome, and overcoming adversity and developing a DEIB statement.

***Inclusive Excellence for Quads Prep (IEQP):** Offer institutional support to achieve academic milestones in Ph.D. programs. Second-year life sciences students gear up for their oral qualifying exam via practice exams in their one-on-one mentoring meetings with faculty, and with a panel drawn from current and former trainees. Additional workshops to build research skills on topics solicited from the trainee student body each year.

***Offer Scientific communication course:** *A cross-listed biology course should be offered based on: PMB290, Making Yourself Clear: How to Give an Engaging Science Talk*, led by Professor Britt Glaunsinger, that develops and refines verbal scientific communication skills.

***Career readiness workshop:** Develop a program to steep trainees in professional practices relevant for both academic and industry career tracks.

Equity practices course: Offer course for all first-year life sciences graduate students on *Diversity, Equity and Inclusion in the Life Sciences* as a forum for discussion of evidence-based practices to promote equity and inclusion in science teaching and mentoring.

Wellness: Offer a monthly psychoeducation workshop from the UC Berkeley Psychology Clinic on resiliency, self-care, and mental health best practices specific to the under-represented student experience. Survey trainees for suggested topics of other workshops, “Imposter Syndrome and How to Overcome,” “Finding Your People in Academia,” and “Mental Health in Academia.”

***Faculty Mentor training:** Offer biology-wide ongoing training program where faculty develop skills for building inclusive, productive, culturally responsive, research mentoring relationships such as *Creating Inclusive Classrooms* and the *Exploring Unconscious Bias* workshops offered by the Multicultural Education Program. Encourage completion of the Multicultural Education Program Certificate series to enhance learning and exploration of equity and inclusion.

Recommendations at the Faculty Level

***Standardize DEIB forward recruitment practices:** Require DEIB statements in all searches and assess DEIB throughout the search process, including as selection criteria when evaluating application. Request and conduct faculty searches at the broadest level and encourage pool/cluster recruitments. Include an Equity Liaison as a full voting member of the committee, appointed by the Equity Advisor. Convene a working group to establish a standardized toolkit of resources for all life science search committees.

Improve outreach: Invest in outreach to postdoctoral fellows from programs that promote DEIB, such as the PPFP and Hanna Grey Fellows (HHMI). This could include a lecture series to showcase potential candidates by sponsoring campus visits.

***Support housing and family needs:** Stated simply, the campus must be more creative in finding solutions to this very real problem. Expanding and subsidizing child care on campus is an obvious first step, and creative solutions like 90-year mortgages need to be explored. For example, Stanford University has a number of housing assistance programs⁹ that are more reflective of strategies needed under current market conditions, including housing salary benefits at hire and after tenure (\$150k spread across nine years in both cases); loans with very low interest, and no payments until you sell; down payment assistance loans with 0-1% interest, and no payments until you sell; subsidized apartments on and off campus; on-campus houses that are for sale below market rates, among others. There is much more that UC Berkeley could do to address this major barrier to advancing faculty diversity.

***Change the FTE allocation process:** UC Berkeley should investigate and advocate for alternative methods of FTE allocation to better support innovative faculty searches and consider the UCLA model as means to improving diversity in faculty searches.

Improve support for partner or dual hires: Campus should investigate and advocate for alternative methods of FTE allocation to better support partner or dual hires

***Support new and junior faculty success:** Support and expand Faculty Link and develop new faculty onboarding/development programs to create networks, success, belonging, and build skills in inclusive teaching and mentorship, grant writing, time management etc. Fund new faculty participation in the NCFDD Faculty Success Program¹⁰ one time before their midcareer review; provide funding for newly tenured faculty to participate in the Pathfinders program.

Provide consistent and clear expectations: Written teaching and service load expectations for new faculty can and should be provided as part of a more structured mentorship program, as well as support for managing such requests. We also encourage departments to review their service and teaching load assignments within an equity audit

⁹ <https://fsh.stanford.edu/>

¹⁰ <https://www.facultydiversity.org/fsp-bootcamp>

Provide mentorship training for junior faculty (including via trainings on best mentorship practices and culturally aware mentoring) and flexible models of mentoring (including mentorship teams to accommodate the mentees' personal, disciplinary, and cultural preferences)

Support cohort and community building on a cross-disciplinary level: Foster cohort and junior faculty connections. Develop regular faculty lunch opportunities to support development of networks for faculty and reduce isolation.

Increase transparency and impact of departmental strategic plans for DEIB: Posting existing DEIB plans or a statement of values and current activities would increase visibility of department efforts and encourage greater participation from faculty. Engage in regular assessments to gauge their progress.

Explore additional methods for increasing inclusion and belonging, especially in countering bullying behavior: As identified above, bullying behavior and exclusion continues to be a major concern. These behaviors are often not reported and when they are, there is no set response unlike with other forms of workplace harassment. The current reporting and response structure must be reviewed and improved.