

2016 Diversity Inclusion Action Plan - Chemistry

1. Objectives	2
2. Chemistry Diversity and Inclusion Advisory Committee (Chem-DIAC)	2
3. Community Diversity	4
4. Awareness and Professional Development	8
5. Curricular Development	10
6. Course Best Practices	12
7. Communication of Program Information and Opportunities	13
8. Outreach	13

1. Objectives.

Discussions of ways to enhance diversity and inclusion among stakeholders of the Chemistry Department have highlighted strengths and deficiencies of the current environment and activities. Developing ways to promote community, to enhance communication among all stakeholders and to increase awareness and thoughtfulness of the impacts our actions have on others arose as themes in these discussions. As a department and as individuals, we have long valued openness, inclusivity and diversity. However, we are perceived as less inclusive and less diverse than we think we are, and than we intend to be. The activities proposed herein are steps toward enriching our community through the objectives of

- establishing an environment within which all members of the University, students, staff, faculty and visitors, feel included and valued as contributors and are comfortable working toward shared aims of learning, communicating, creating and applying knowledge;
- realizing a community of individuals, diverse in backgrounds, interests and approaches, who communicate and collaborate with positive intent, respect and thoughtfulness;
- developing a wider range of opportunities for individuals to develop interest in chemistry and to contribute to the creation and communication of chemistry knowledge within the University, the profession and the public.

Attaining these objectives will require the Chemistry Department to make changes, implement new activities and develop new collaborative partnerships within the university. These goals also will require new financial resources from the University. Resources to be reallocated are required in this document to include: (pg. 5) increased summer research stipends for undergraduates on financial aid; (pg. 6) financial support from the Office of Institutional Diversity and Inclusion for regular faculty participation at national meetings run by scientific organizations supporting scientists of color; (pg. 7) graduate school support of two additional TA positions for graduate student course and program mentoring; (pg. 8) highly competitive, rapidly generated faculty start-up offers with flexibility in hiring procedures; (pg. 11) two full-time lecturer positions to develop and run small group problem solving sessions for all introductory chemistry courses. These resource allocations are needed to support some of the worthwhile activities proposed to achieve the objectives outlined in this draft plan. In reality, the set of proposed activities are too numerous to develop and implement immediately and to sustain. Thus, the department, with guidance from the Chem-Diversity Inclusion Advisory Committee, will need to establish priorities and a multi-year schedule to implement activities.

As a final observation, meetings of the DIAP exploratory committee (Russo-Rodriguez, Stratt, Zimmt) with members of the DUG leadership (Chem, Biochem), concentrators, undergraduate course facilitators, members of BCSC (Brown Center for Students of Color), NSC (New Scientist Collective), WiSE (Women in Science and Engineering), graduate students and faculty produced frank and illuminating discussions, useful insights and suggestions that are the origins of many elements presented in this plan. Student and faculty participants recommended strongly that such conversations be continued on a regular basis moving forward.

2. Chemistry Diversity and Inclusion Advisory Committee (Chem-DIAC)

Chemistry will establish a Diversity and Inclusion Advisory Committee (Chem-DIAC) whose charge is to identify, design, oversee implementation and assess efficacy of activities and

policies to attain the objectives stated above; and to recommend modifications of or additional objectives in response to feedback and information collected in the course of its activities.

Chem-DIAC will consist of two or three faculty, two graduate students, two or three undergraduates and one or two staff members. The graduate student members should include both an international and a domestic student; the undergraduate members should include chemistry concentrators (ChemDUG, BiochemDUG, WiSE, Chem-Spectrum) and non-chemistry concentrators with interest in chemistry courses or research (NSC, Minority Association of Premedical Students (MAPS), Society of Women Engineers (SWE), WiSE, Society for Advancement of Chicano/Hispanics and Native Americans in Science (SACNAS)). The staff member(s) should be interested in having increased responsibilities for interaction with undergraduates and / or graduate students in addition to holding discussions with other staff.

(i) Chem-DIAC will meet at least twice per semester to explore, plan, and to assess whether activities by the department are enhancing the sense of community, inclusion and the diversity of individuals interacting with Chemistry.

(ii) Chem-DIAC will be responsible for soliciting and analyzing input / feedback from the department and the Brown community regarding the above objectives and recommending appropriate actions.

(iii) Chem-DIAC will work to improve communication of opportunities and activities for the department's various constituencies and to create robust channels for two-way communication with all constituencies.

Examples of possible department and community activities include open "meet and greets" with faculty teaching introductory courses; meetings of faculty with students from historically underrepresented groups (HUG), including first generation students, students of color, women students, and others; workshops / lunch discussions (within Chemistry and/or with other STEM departments) on diversity, gender, bias and inclusion; workshops / lunch discussions of best teaching practices for instructors (undergraduate / graduate teaching assistants and faculty).

Working with the Sheridan Center, Science Center and/or other STEM departments, Chem-DIAC should help implement confidential surveys related to diversity, inclusion and community (the objectives of this plan) for students within introductory courses, for concentrators, graduate students, post-docs, staff, and faculty. These surveys could probe climate (department, course climate), learning gains from courses and reasons why students stopped after taking one or more introductory chemistry courses. The Chem-DIAC should explore (with STEM DIACs, Sheridan Center and Brown organizations) whether there is benefit to survey directly Brown organizations representing students who are members of historically underrepresented groups.

Chem-DIAC should explore optimal ways to enable the department's constituents to (i) interact directly with Chem-DIAC members, (ii) help larger groups of student gain information about courses, concentration tracks, research opportunities (science and education-based), undergraduate and graduate fellowship opportunities (etc). Chem-DIAC open hour schedules and activity summaries, should be highlighted on the department website. Finally, the Chem-DIAC should explore how to interface with University or STEM ombuds-positions to assist individuals or groups that want to share concerns confidentially.

Chem-DIAC should recommend procedures to publicize and receive comments on its recommendations and a process for bringing the recommendations and feedback to the department for discussion, modification and approval by the faculty.

3. Community Diversity

Undergraduates enrollments (2011-15) - Undergraduate enrollments within introductory and 1000-level Chemistry courses average 1700 per year, with 41% of enrolled students identifying as white, 21% as students of color, 20% as Asian and 18% identifying as other groups. 53% of enrollees are women and 47% are men.

Concentration completions (2011-15) - The Chemistry Department has three concentration programs, Biochemistry, Chemical Physics and Chemistry, and graduates 40 concentrators per year, with 48% of graduates identifying as white, 26% as Asian, 10% identifying as students of color, and 21% identifying as other groups. 45% of graduating concentrators are women and 55% are men.

Concentration Diversity - Making progress building more welcoming, supportive and inclusive environments within introductory classes and the department (Sec. 4, 5.) should help more students find success from their efforts in these classes. These changes also may bring more students to select chemistry-related concentrations. More specific efforts will be undertaken to double, within five years, the number of undergraduate concentrators who identify as members of historically underrepresented groups.

(i) Chem-Spectrum: Undergraduate groups, such as Chem-DUG and Biochem-DUG, provide students with opportunities to learn more about the concentrations, help students select, navigate and succeed in courses, research and more. The Chem-DIAC will meet with undergraduate and graduate students of color and first generation students to assess interest and enthusiasm to develop a student group (Chem-Spectrum) that can work, as a cohort and with the DUGS, with the Chem-DIAC and with the department to identify and resolve course climate concerns, to advocate for and work toward increasing diversity within the department, and to help guide and support younger students' efforts to explore and complete concentrations and careers in chemistry fields. Conversations with other departments and existing groups (e.g. Mosaic+) will help guide development and enactment of Chem-Spectrum. If students in other departments and those departments are interested, impact and inclusiveness might be increased by establishing a cross-department group (STEM-Spectrum) for undergraduate and graduate students of color and first gen students.

(ii) Matriculation Outreach: The department will work with the admissions office to provide information to and to recruit students of color, first generation students, low-income students, women and members of other historically underrepresented groups that have been accepted to Brown and expressed interest in chemistry-related disciplines. Providing more details about opportunities in chemistry at Brown and establishing opportunities to speak and interact with current student members of the department may provide potentially matriculating students useful insights and an early start joining a network of chemistry students. These networks will be of use when students are at Brown. Outreach programs involving chemistry department

personnel including participation and mentoring in local community schools will include efforts to attract a more diverse pool of local applicants.

(iii) **Eliminating Barriers to Summer Research:** Our undergraduate research program is an invaluable opportunity for a broad range of students, concentrators or not, to participate as colleagues and to see first-hand how science is practiced and developed. Gaining hands-on experience advancing a research project is an invaluable component of undergraduate education in science. Initiating research in the summer, when competing time obligations are minimal, helps students learn their field more rapidly and with fuller understanding, helps develop stronger relationships with research mentors, progress further on projects and derive greater satisfaction from efforts. This research momentum carries over into the academic year, as experienced researchers are more efficient using limited time windows. Chemistry faculty use combinations of grant research funds and summer UTRA's to provide living costs and a small stipend to undergraduate research colleagues. However, summer earnings requirements exclude some students on financial aid from exploring or accepting summer research positions as the available funds are insufficient to meet both summer living costs and financial aid summer earning requirements. To facilitate access to the benefits of summer chemistry research for students on financial aid, the Chemistry Department will use accumulated unspent balances in an eligible endowment account to provide supplementary (scholarship) funds to help students meet summer earnings requirements. Implementing this endeavor will require collaboration with the Financial Aid Office, the Dean of the College UTRA program, the New Scientist Collective, the First Generation College Student Initiative and other programs. The accumulated unspent balances will last a few summers, at most. *Continuing this program for chemistry concentrators and other science students on financial aid will require financial support from the University.*

(iv) **Conversations with Faculty:** As noted in the best practices and Chem-DIAC sections, the department will run "meet and greet" sessions to enable students and faculty within large introductory courses to interact in more relaxed, social settings. Emphasis will focus on paving the way for undergraduates to become involved in research activities. In addition, the department will ask to collaborate with the New Scientist Collective (NSC), the Brown Center for Students of Color (BCSC), the First Generation College Student Initiative, the Minority Association of Pre-Medical Student (MAPS) and other programs to establish additional opportunities for students and faculty to meet, discuss concerns and build more comfortable and effective communication.

Doctoral Program completions (2011-15) - On average, fourteen students per year completed doctoral studies during the five prior years (45% female and 55% male). Nearly two-thirds of these graduates were international students, one quarter were white, and less than 2% of these graduates identified as students of color.

Graduate Program Diversity. The efforts described below aim to build a thriving cohort of graduate students of color that comprise 10% of incoming graduate classes within 5 - 7 years and 15-20% of the program within 10 years.

(i) **Recruiting:** Faculty and graduate students in the department currently are working to increase and broaden the composition of the doctoral program. Faculty and graduate student

recruiting trips to colleges and universities distinctly increase applications and matriculations from students at visited schools. The department will direct this effort by inviting speakers from minority serving institutions that graduate many students with chemistry bachelor's degrees and requesting to present talks and recruit at these institutions. To widen our scientific contacts, Chemistry faculty will seek to participate in the national conferences of SACNAS (Society for Advancement of Chicano/Hispanics and Native Americans in Science), NOBCCHE (National Organization for the Professional Advancement of Black Chemists and Chemical Engineers) and of the Leadership Alliance. Building a network and relationships with individuals and institutions will take some time, so the effort will need to be prolonged and reliable. *Financial support for regular faculty participation at these meeting will be requested from the Office of Institutional Diversity and Inclusion.* Participation may also help identify candidates to recruit for nomination as Presidential Diversity Postdoctoral Fellows.

(ii) Inclusion: Graduate students participation in Chem-Spectrum (STEM-Spectrum) will be a valuable means to strengthen undergraduate - graduate communication within the department and to provide mentoring and information of value to both. The membership of Chem-DIAC will include undergraduate and graduate students of color who, ideally, will be active in Chem-Spectrum. Chem-DIAC will meet regularly with students of color (at least once per semester) to allow two-way communication of ideas and concerns and to monitor progress of actions. Expansion of Brown's IMSD program (Initiative to Maximize Student Development) will include graduate students of color within Chemistry into a larger IMSD community at Brown, and will provide access to valuable programming and supportive, experienced networks that help graduate students thrive.

(iii) Graduate Student Community and Support. New chemistry graduate students participate in a professional skills class during their first semester. Aspects of this class, which is connected to the department colloquium, include library and search skills, discussions of navigating the first year of graduate school (with more senior students), identifying research groups, ethical conduct of research, strategies for reading papers and preparing short talks. The students work in teams, intentionally composed of individuals with different backgrounds, genders and research interests. The teams work on various projects, including preparing previews and summaries of the science to be presented by the colloquium speaker. A key objective of this skills class is establishing a sense of community within the cohort of first semester students. Moving forward, the colloquium class will incorporate discussions of diversity, gender, bias and inclusion (likely to include more senior graduate students also). These discussions will require collaboration with the Chem-DIAC, possibly with Chem-Spectrum and assistance from the broader DIAP effort at Brown,

Current graduate students remark positively on the colloquium class' impact but note that the class' conclusion after one semester coincides with students entering different research groups. Ending the class disrupts some of the threads established within the first year graduate cohort, particularly between domestic and international students. The resulting lack of communication and community among graduate students in different research groups and from different racial groups weakens the graduate program scientifically and functionally. We are exploring ways to retain and strengthen the collaborative community established within the colloquium class. One approach we are evaluating is to reshape first, second and third year graduate program

milestones to include elements of peer review / feedback on milestone projects using the teams formed in the first semester. This could be done by continuing the Colloquium class into the students' second semester, developing peer review training and involving upper-level graduate students in the peer review / feedback process. Establishing expectations, metrics and demonstrating benefits of constructive peer review should strengthen student performance on metrics and would continue building community and strengthening connections within the cohort, across research groups and between first year and upper-level graduate students. Department funding should be provided to celebrate successful milestone completion by the cohorts.

Senior graduate students strenuously pointed out many detriment of the complete absence of course support for first year graduate students. They contrast this with the large, and growing, varieties of course support for undergraduate students in introductory courses. Some faculty members suggest that graduate students form study groups, but no formal scaffolding or department / university support is provided. Student attrition from the graduate program is largest during the first two semesters of courses. The students emphatically recommended that advanced graduate students have a formal assignment / role in graduate courses and serve as teaching assistant / mentors for first year students. This makes programmatic sense and financial sense, as the department and University lose investments made when graduate students depart after one year. The department must reconcile advanced graduate students undertaking these roles with the time demands of their research, their support on external grants and their professional development. *To make this happen, the department will strive to allocate one/two additional teaching assistant slots. Splitting these four ways (50% TA appointment) will enable four senior graduate students, appropriately trained and mentored, to invest 8 - 12 hours per week facilitating and mentoring first year students' course and program progress, with an appropriate, concomitant reduction of charges to external grants.* In addition to scaffolding first year student success, these activities would offer useful experience to advanced students considering academic careers and would be a logical first step for those interested in applying for the Deans' Faculty Fellowship.

Faculty Diversity - The department currently has four open faculty positions and anticipates additional positions will open in the next 5-7 years. The efforts described below seek to increase the diversity of faculty applicant pools so that, over the next 5-7 years, the department hires two faculty who are members of historically underrepresented groups and continues to hire equal numbers of female and male faculty. *Achieving these goals will require the University to make strong, flexible and rapidly assembled offers to convince applicants to join Brown's Chemistry Department (strong start-up packages, spousal positions, making offers prior to finalizing searches).*

(i) The Chem-DIAC in collaboration with the colloquium committee and Chemistry faculty, should invite scientists of color, women and other historically underrepresented groups to present department colloquia and / or named lectures each semester. In addition to personal contacts, the committees should solicit names of speakers from faculty, post-docs, graduate and undergraduate students, Chem-Spectrum, WiSE, MAPS and the DUGs. As a regular part of speaker visits, the department should ask speakers to recommend candidates for open faculty positions or as candidates for Presidential Diversity Postdoctoral Fellows.

(ii) Chem-DIAC and department faculty should attend SACNAS and NOBCChE National Meetings to identify candidates and encourage applications to open searches for junior or senior faculty positions, to identify individuals to invite as colloquium speakers, as potential hires or to help identify potential hires and to identify Presidential Diversity Postdoctoral Fellow candidates.

(iii) The department should advertise all faculty and post-docs openings on SACNAS and NOBCChE websites.

(iii) Department faculty should work with Chem-DIAC, the department chair and other departments to identify and advance the nomination of candidates for the Provost's Visiting Professor Program (5/18/16 e-mail from Provost). Identifying individuals whose scholarship overlaps with other departments or programs will enhance the chances of recruiting these candidates as visiting professors at Brown.

4. Awareness and Professional Development

As noted in the introduction, the department and faculty have long valued openness, inclusivity and diversity. Those values, however, have not translated fully into undergraduate and graduate student perceptions. While it is likely that undergraduates arrive at Brown with notions (biases) about chemistry as a field, it appears that department processes, course structures, statements and actions of instructors¹ fail to convey our values. The undergraduates we spoke with, both non-concentrators and concentrators, shared some impressions of the department that are cause for reflection:

“the chemistry department culture - it's okay for students to be left behind”

“the faculty's attitude is that strong students will do just fine”

“negative language from professors creates a culture of intimidation in courses”

“faculty should not joke about the difficulty of a course”

“faculty are accepting of frustration in the room”

“the faculty instructor stated he/she did not want to be teaching this course”

“some department courses are sexist”

“faculty don't recognize or bother to know names of the small number of concentrators”

“I was not able to join the research group because I had no research experience”

“I feel locked out of the chemistry department”

“the faculty seem unaware or unconcerned about disturbing events on campus that negatively impact student learning and performance”

Graduate students stated they “felt peripheral to the department” and “were poorly integrated into the department and as a group”.

Faculty shared frustrations in not having some of their concerns heard respectfully by colleagues, irrespective of any disagreement or outcomes.

Knowing our colleagues' deep commitment to teaching, to student advancement and success, we believe that some of the above mentioned impressions derive from ineffective communication. Students can enter college chemistry courses with negative or anxious mindsets and, as a result, be pre-disposed to experiencing course environments as non-

¹ The term “instructor” includes faculty, graduate students or undergraduates with a formal instructional role

supportive and to hearing instructor comments in a negative light. Instructors¹ need to be aware that this tension exists and act to reduce it; that their “authority as instructors” can distort messages they intend to convey in statements and actions; that their words, both positive and negative, can impact students deeply; that neutral, but off-hand comments and jokes are likely to be received unconstructively by many students in a class. It makes no sense for weeks of hard work and good will, by students and instructors, to be vaporized with an ill-considered statement or course process. To improve instructor understanding, awareness and ability to succeed in these situations:

(i) The Chem-DIAC should work with the University, the Sheridan center and other STEM departments to develop and hold course workshops / lunch discussion each semester to increase department (instructors and staff) awareness of oft arising issues and to enhance instructors’ abilities to communicate effectively, with the respect and concern they hold for students and their learning.

(ii) These discussions should be informed, in part, by data collected from student surveys. The department and Chem-DIAC should work with the Sheridan Center and other STEM departments to design and implement surveys to assess student impressions of a course and its instructor(s) at various time points, possibly including prior to, during and upon completion of the course. At appropriate points in a semester, these surveys should probe students’ assessment of the course operation, including course administrative procedures, course support resources that they use, the efficacy of these resources, how engaging and inclusive the various course components are and suggestions for ways to improve their learning. Parts of this information, appropriately stripped of personal identifiers, should be integrated into the Chem-DIAC directed course workshops.

As noted above, instructor commitment to student learning does not automatically generate optimal learning environments for students. All individuals have biases, explicit and implicit, that impact decisions and behaviors and require introspection and conscious action to find and manage. Instructors need to be cognizant of their bias and assumptions. The discussions with undergraduate and graduate constituents pointed out a need for instructors to be conscious that students in courses have widely varying educational and experiential backgrounds, and have vastly different awareness of and comfort levels engaging Brown University resources to maximize their learning (resources such as faculty office hours, teaching assistants, group and individual tutoring, group problem sessions). Less developed understanding, low exams scores, failure to request help at the first signs of difficulty are not acceptable grounds to “write students off”. Faculty should actively and genuinely encourage students, provide assistance to the extent possible, and regularly advertise and promote use of department and University resources, all to help students succeed.

It is essential that instructors are aware that their biases and ill-considered words or behaviors can compromise the sense of belonging, inclusion and welcome within Chemistry of individuals who are members of historically under-represented groups, including students of color, first generation students, women, LGBTQ students, and of individuals who lack self-confidence (imposter syndrome).

(iii) The Chem-DIAC should join a University, Sheridan Center, STEM department effort to implement strategies and processes to help individuals (faculty, staff, students) and the departments identify implicit biases and to assemble and disseminate best practices to prevent bias impact on members of the community. These efforts should include hosting discussions and events in the department, in collaboration with the University and other STEM departments, to raise faculty and student awareness of challenges faced by members of historically underrepresented groups, including students of color, women, first generation, LGBTQ and other groups who may feel excluded. These best practice discussions will be more effective if participants can hear and understand the powerfully negative impact of failing to address underlying biases.

(iv) The Chem-DIAC should work with other STEM departments and the University to invite speakers whose research address ways of enhancing inclusion and diversity in STEM fields; that identify non-productive behaviors and /or effective strategies for enhancing student learning, sense of inclusion and interest in STEM fields.

5. Curricular Development

The Chemistry Department has implemented new curricular programs and will explore further curricular changes to produce a more inclusive and effective learning community for students and to explore issues of diversity in STEM fields.

(i) The chairs / deans of STEM departments will work with the Program in Science and Technology Studies (STS) to create an STS course centered on impacts of STEM disciplines on societal problems. A part of this effort will be to collect and share within introductory courses constructive examples of STEM that illustrate the relevance and applicability of material being taught in these courses.

(ii) The Chem-DIAC will explore Chemistry involvement in a course on "Race and gender in the scientific community." Applied Math has been exploring this as a possible outgrowth of a fall 2014 GISP on race and gender in the sciences. They have received encouragement and input to pursue this further. Applied Math's DIAP includes the following statement "We plan to develop this course in fall 2016 and offer it for the first time, co-taught with a graduate student from Africana Studies, for around 10-15 students in spring 2017 in our department. In subsequent years, the course will be taught by faculty from other Physical Sciences department (Chemistry, Mathematics, and Physics are supportive of this plan). The goal for this course is to learn about the scientific literature on diversity in the physical sciences, and allow STEM faculty to work with and learn from students and faculty from Africana Studies to talk about race and gender and facilitate discussions about these issues."

(iii) The Chemistry Department will develop of a research training course using as a model the lab technique workshops employed by BioMed departments to provide undergraduates and first year graduate students a condensed introduction to chemistry research skills, tools and methods. The course topics could include data management, maintaining laboratory notebooks (paper, electronic), reaction safety, lab safety, hazardous waste training, hands on instrumentation training (NMR, mass spec, IR, UV-Vis, Fluorescence, TEM), chromatography, and computational methods.

(iv) Small Group Problem Solving Sessions

Beginning in fall 2011, the Chemistry Department incorporated mandatory small group problem solving sessions as part of the CHEM0100 curriculum (Introductory Chemistry). This was done to provide interactive scaffolding and to establish two-way communications between the instructors and all students in a class populated by students with an exceptionally wide range of backgrounds and preparation. Problem session exercises were developed by the course instructor, Prof. Russo-Rodriguez. Problem sessions were facilitated by teams composed of faculty, graduate teaching assistants and undergraduates teaching assistants. The problem solving activities met the learning and inclusivity objectives and were received appreciatively by most students. The problem solving sessions continue to be an effective component of CHEM0100. Faculty, post-doc, graduate and undergraduate students, with input from the Sheridan Center and the AAU STEM grant, continue to evolve problem session content and implementation.

Scaffolded, small group problem solving activities were introduced as a voluntary option to students taking CHEM0330, Equilibrium, Rate and Structure, beginning in 2014. In the SP14 course, 80 out of 200 students participated regularly in these voluntary sessions. In SP15 CHEM0330, 110 out of 169 students opted to participate regularly. In FA15, 160 out of 240 students in one section of CHEM0330 voluntarily participated in problem sessions throughout the semester. In SP16, 120 out of 240 CHEM0330 students participated in problem sessions throughout the semester. Overall, CHEM0330 small group problem solving activities enhanced student learning, met inclusivity objectives and were received appreciatively by most students.

Based on their positive impacts on learning, the department is looking to run scaffolded, small group problem solving activities for both sections of fall semester CHEM0330 and to all sections of the organic chemistry sequence, CHEM0350 and CHEM360. *Committed University financial support is needed for problem solving spaces and for lecturers (two) in order for current problem sessions to be continued and for problem sessions to be offered in the other large introductory chemistry courses.* Prior financial support for the CHEM0330 lecturer and other facilitators who developed and ran CHEM0330 problem sessions came from a mix of temporary teaching funds, an AAU grant and an HHMI grant awarded to Brown University STEM faculty. The AAU grant has expired; the HHMI grant and temporary teaching funding mechanisms also are not stable sources for curricular development. Thus, University support of additional lecturer positions is required for the small group problem sessions to continue enhancing student learning. In addition to preparing problem session materials, training and supervising problem session facilitators and facilitating problem sessions, the lecturers will add capacity to address the large, persistent and unmet need for individualized faculty interactions to help struggling students succeed.

(v) The Chemistry Department will continue to assess and adjust the introductory course sequence and consider options to provide optimal classroom learning opportunities for undergraduates (concentrator and non-concentrator) and graduate students.

6. Course Best Practices

Discussions with constituents of the Chemistry Department produced valuable best practices suggestions for instructors, particularly those teaching introductory courses. These will be discussed and developed by the Chem-DIAC in collaboration with the Sheridan Center, and then shared with instructors. The Chem-DIAC will recommend priorities for best practice activities that require funding. Best practices to consider:

- Provide open opportunities for students and instructors of large courses (and possibly concentration courses) to interact socially, not about class material.
- Collaborate with organizations that represent students of color, first generation students, women and others groups, to schedule early semester meetings with the instructors of large introductory courses.
- Instructor self-introduction (history, instructor objectives, solicit student goals?)
- What have you heard about this course? (small group discussion; then open class wide)
- What assumptions are you bringing into the classroom (about the course, you, the instructor)?
- Hold information sessions at the start of large courses during which former students discuss strategies that worked, things that caused stumbles and how to recover.
- Post on Canvas “what you need to do” letters from prior year students to the incoming class
- Reasonable to state that a class will be challenging and will require student effort. This should be done with respect for the students, the class and the instructor. Then.....
 - Encourage student participation via in-class questions, problem sessions, study groups, help sessions, regular self-assessment, and instructor assistance.
 - Regularly emphasize the importance of doing and learning from problems
- Regularly summarize class support resources (also post on Canvas) and encourage student use
- Encourage students to network with classmates and class graduates in an attempt to address student feeling of isolation within the class
- Can be useful for instructor to mention that she / he has stumbled with certain subjects and how the instructor overcame the issue with effort (stumbles are part of success)
- Add a statement about inclusiveness in the syllabus - “don’t have to leave your identity at the door: if you feel marginalized in this course here are possible options...”
- Information about teaching strategies to avoid and strategies to use that increase classroom in inclusiveness and avoid marginalizing students by race, ethnicity or gender (e.g., waiting longer to select an answerer after posing a question allows more students time to formulate answers, and increases the likelihood that women will participate; be aware of who answers questions and select more broadly from the class).
- Address exam performance respectfully and with options for students, e.g., deploy resources to help students after exams released (additional TA hours, most common mistakes documents on Canvas). Send carefully crafted e-mails to students who have done particularly poorly to recommend meeting with instructor or other resources.

7. Communication of Program Information and Opportunities

In each of the meetings held to discuss diversity, inclusion and community, students shared their difficulties and frustrations collecting information about chemistry courses, department programs, research and teaching opportunities. These difficulties decreased, but were not eliminated after students chose to concentrate in a chemistry related discipline. While the

department considers itself open to all student inquiries, the students' experiences point to a need to improve communication and access to information. Currently, the department does not have a publicized, primary contact for all undergraduate inquiries. The department does maintain an informative webpage but it is clear that many students do not explore it fully. Rose Barreira serves as a point of contact for graduate student programmatic and financial inquiries. Sheila Quigley serves as a contact person for Visiting Scholar and Post-Doctoral Scholar administrative questions. The department should explore establishing a resource position or structure to which all students (undergraduate, graduate, post-doctoral) can ask questions, seek preliminary guidance and information, and receive references to secondary contacts within and outside of Chemistry that can provide additional information. The department has begun assembling such a resource for research lab opportunities. It may be useful to survey students to identify the subjects (e.g., course-selection, course-labs, course-study assistance, research opportunities, laboratory trainings, fellowship opportunities, Chem-DIAP contacts, seminars) of greatest interest to help guide development of the contact structure.

8. Outreach

In addition to communication activities described above, the department should invite the University community to distinctive events and develop connections outside the University that advance the Chem-DIAP objectives.

- All students enrolled in chemistry courses should receive e-mail invitations, with speaker and seminar information, to the honorific lectures held each year: the John Howard Appleton Lecture and the Leallyn B. Clapp Lecture. Course instructors also should invite students.
- Invite NSC, SACNAS, WISE, MAPS to identify and jointly invite a Chemistry Colloquium speaker annually. Speaker schedules should be adjusted to facilitate speaker interactions with graduate and undergraduate groups.
- Work with local schools and teachers to establish a "Research Experience for Teachers" program (RET) centered in the Department of Chemistry. Faculty members in the department have expressed interest in exploring the development of such programs. Prof. Colvin successfully obtained NSF funding for a RET program focused on nanotechnology at Rice. Involvement of other departments at Brown could be explored. One component of an RET program might develop research experiences for both Providence high school teachers and their students. Expanding such a program through collaboration and involvement of local community college faculty and their students would allow Chemistry faculty to increase interest in STEM within the Rhode Island community.