

Science Culture and Accountability Plan Department of Biochemistry

Science Culture

The primary goal of the members of the Department of Biochemistry is to carry out basic research, also known as discovery science, that uncovers the molecular components and detailed molecular mechanisms underlining biological and cellular processes and to educate the next generation of outstanding biochemists. The scientists in the Department of Biochemistry typically use an integrated approach that combines cutting edge methodologies in molecular biophysics, NMR spectroscopy, macromolecular crystallography, cryo-electron microscopy, chemistry, genetics, a number of different light microscopies, enzymology, cell biology and computational biology. As is true for all areas of basic, translational and clinical research, we are committed to the dissemination of data that are obtained ethically, are accurate and are reproducible. This is the expectation for all Principal Investigators, postdoctoral fellows, graduate students, technicians, undergraduates and office staff, who work in the Department of Biochemistry. Our overarching goal is to carry out research in an open, unimintimidating environment in which members of the faculty and indeed the entire Department of Biochemistry feel uninhibited from asking each other to explain any aspect of their research or job and to bring up points to investigators that they feel need clarification.

The research programs that are run by the Principal Investigators are often multidiscipline and can involve multiple intramural and extramural collaborators. We expect that each collaborator on any submitted manuscript, grant or patent to have vetted fully the veracity of each piece of data contained within that given document to the best of her or his ability. We also expect that these data are reproducible by outside laboratories. For multiple laboratories within the Department of Biochemistry much of the key primary data are vetted externally. For example, those researchers in the Department who are “structural biologists” must submit their NMR, crystallographic, structural and modelled data to the RCSB Protein Data Bank, an unbiased international repository, which then critically evaluates key aspects of the data and structures. The vetted data are returned to the depositor for her/his consideration, as on occasion minor discrepancies are found between the deposited and vetted data. Such deposition is a requirement for publication by essentially all journals. Further, these data are released to the public either before or more typically a week after publication of the manuscript that describes this structural work. In an effort at complete transparency, all members of the Department of Biochemistry shall also make all of their reagents and data available to the scientific community. All members of the Department of Biochemistry will make these resources and reagents available to the greater research community using Materials Transfer Agreements in accordance with policies of the National Institutes of Health. This must be done immediately after publication of the germane study that utilizes these new resources and reagents.

As a major part of the internal vetting of the data from laboratories, all active laboratories in the Department of Biochemistry hold organized group meetings. All members of the

laboratory are required to attend. Although the mechanics of each group meeting varies from laboratory to laboratory, these are opportunities for each member of the laboratory to describe her or his data and to answer any question that arises during these presentations. Furthermore, there are examples of multi lab group meetings, which have the added benefit of outside expertise and perspective and lack of bias. Finally, each laboratory has developed a specific standard operating procedure (SOP) with respect to data management, provenance and storage. Most SOPs also address directly with the issues of scientific integrity, cultural integrity, and respect.

Accountability

Multiple mechanisms are in place to ensure the highest level of scientific accountability. These include:

Open-Door Policy: The Chair of the Department has an open-door policy. Multiple members of the Department, including faculty, graduate students, postdoctoral fellows, and technicians have come to utilize this policy (without appointments) in order to discuss issues that involve their mentors or colleagues, their research or some other Departmental or laboratory issue. This allows the Chair either to help with these problems directly or point the visitor to the person or persons within the Department, the School of Medicine or Duke University, who are better able to address the issue. The effectiveness of this policy has been underscored by the positive resolution of several issues typically involving disputes and miscommunications between personnel. It should be well noted that the Director of Graduate Studies also has a similar open-door policy, thereby offering a second venue for our graduate students to discuss issues of scientific culture and integrity.

Annual Retreat: The Department of Biochemistry holds an Annual Retreat that is attended by all graduate students, postdoctoral fellows, many research assistants and associates and principal investigators from each Biochemistry laboratory (including secondary faculty appointees). At the retreat graduate students, postdoctoral fellows and junior faculty members present their data either orally or as a poster. The retreat allows in-depth analysis and discussion of the data by members of the entire Department, not only during the presentations but also throughout multiple breaks and free periods. The retreat is a critical part of our Biochemistry Science Culture. It is in this less formal setting that our graduate students, postdoctoral fellows and faculty members “bond” both scientifically and ethically. Everyone sees the high and ethical standards that are expected in both their presentations, e.g., acknowledging fully the work of others and the possibility of alternative explanations/interpretations and models, and in their questions, which are always professional even when disagreeing with the interpretation of the data. The Retreat together with the Biochemistry Seminar Series is a critical part of the complete education of our graduate students and postdoctoral fellows and the ongoing education of our faculty members.

Research Forum: The Department of Biochemistry maintains a weekly seminar series at which prominent outside speakers present their latest results. During this Friday series, the Department also reserves typically six presentations by members of the Department. These one-hour seminars begin with a brief overview of the work going on in the laboratory by the PI, which is then followed by two or three short talks that are presented by more senior graduate students or postdoctoral fellows of the laboratory. These are lively affairs with very open discussion that involve all the speakers and the audience. The discussions are continued after the presentations during a pizza and soft drinks luncheon at which time younger graduate students are encouraged to become more fully engaged.

Faculty Meeting: The Department of Biochemistry schedules weekly faculty meetings at which the business of the Department, School of Medicine, and the University is discussed. Faculty meeting provides an open forum for the discussion of multiple issues facing the Department, including graduate student training and education and any issue regarding research integrity. Often, there are presentations by members of the School of Medicine or the University that bring the Faculty up-to-speed with respect to issues such as data back-up, data provenance and other issues involving scientific culture and integrity. The faculty meetings provide a great venue for the exchange of ideas and constructive criticism. Although these weekly faculty meetings have been held for as long as I know, they provide one of the most useful forums in which the faculty can speak openly about scientific culture. They are particularly insightful to the younger and new Duke faculty as there is often a diversity of opinions about multiple issues that is often linked with experience. The Faculty Meetings are also one of the best arenas for the Chair to gain a consensus of what the Department should consider proper academic behaviour and the best scientific culture.

Annual Meetings with Graduate Students and Postdoctoral Fellows: The Chair, together with the Biochemistry Director of Graduate Studies meet annually with all members of each year of the Biochemistry Graduate Student Program. These meetings typically take place in early Spring over a period of a month. These are no-holds barred, but very respectful affairs in which each class expresses its concerns and offer its opinions on any aspect of the Department. They also offer opportunities for the Chair and the DGS to reinforce the importance of rigorous and ethical research and to remind each group that there are several venues open to them to report any problem, ranging from discussions with the Director of Graduate Studies Assistant, the DGS, the Ombudsman of the Department, the Chair of the Department up to meeting with the Dean of the School of Medicine. As a recent example of just one interesting topic and resulting discussion with the graduate students was the question that was asked of each class, "What do you think our, meaning the faculty, expectations should be of you in terms of publications, i.e., your productivity?" Remarkably there was a nearly unanimous consensus amongst each class, not so much in terms of numbers of publications, but that they should be producing the best science possible in order to publish in the most appropriate journal. Thus, we are seeing the reinforcement of one

key aspect of scientific culture, publication of high quality, rigorous and reproducible science in order to earn a doctoral degree. These meetings as they are highly productive and allow us to reinforce the concepts of a rigorous scientific culture and accountability for the results and data generated whilst pursuing the PhD degree. A similar annual meeting is also held with the postdoctoral fellows. The postdoctoral fellows are also reminded of the opportunities and resources that are available to them through the Office of Postdoctoral Services.

Responsible Conduct in Research (RCR): Great graduate students and postdoctoral fellows are cornerstones to any successful research program. As part of their academic and scientific maturation, these young scientists are taught more formally about all aspects of the research enterprise, which includes ethical and respectful behaviour towards all. As part of this education, all entering Biochemistry graduate students and postdoctoral fellows take a course in Responsible Conduct in Research, as are those students in their third year. The former weekend-long course covers a variety of issues and often leads to thought-provoking discussions amongst students after taking this course. Starting in the 2017-2018 academic year, a course in Responsible Conduct in Research will be taken by all Biochemistry Faculty members.

Annual Graduate Student Research Advisory Committee Meetings: All Biochemistry graduate students are required to form a Research Advisory Committee at the end of their first year in graduate school and to meet with this Committee at least once per year. The Committees are typically composed of four to five members with at least one member, who is from an outside department or even from another university or institution. At these meetings the students present their progress for the year and are asked multiple questions about the interpretation and quality of their data. However, a unique feature of the annual meetings of the Biochemistry Department is that before the meeting presentation formally begins, the student leaves the room and the graduate student mentor(s) is asked to summarize the progress of the student and if any specific issues, scientific, academic or other, have arisen that need addressing. The committee then raises these issues with the student at some appropriate point during the meeting. Perhaps the truly unique feature of the Biochemistry graduate student advisory meetings is the opportunity for the graduate student to discuss any issue that she or he is having with her/his mentor. To do this properly the mentor is asked to leave the room at the end of the formal presentation, scientific discussion and questioning. At this point the advisory committee asks the graduate student if there is **any** issue that she or he would like to raise. This provides the student with the opportunity to raise concerns, which if present are handled in the most appropriate manner by the committee and mentor or passed on to the Director of Graduate Studies, the Ombudsman of the Department or to the Chair. Fortunately, problems are rare and typically readily addressed. This opportunity that is afforded the student to bring up any issue in a comfortable and supportive environment buttresses our efforts in the Department to build and maintain a respectful and positive scientific culture.

Monthly Meetings with Junior Faculty and Junior Faculty Mentoring Committees:

Beyond the ability of all faculty members to drop in on the Chair of the Department to discuss any issue, the Chair of the Department meets individually with each Assistant Professor once per month. These meetings are locked into the calendar of the Chair and are used by the junior faculty to discuss **any** issue that he or she might have and to give advice as requested or needed. These appear to have been highly successful in bringing our young faculty members up to speed on multiple issues that are often not directly related to their science but to the trappings surrounding science and what it means to be an academic scientist. They are also meant to have a calming effect as young faculty today are quite worried and often need to be reminded that the Chair and the Department are highly supportive of them and are there to help them develop all aspects of their academic program. In addition to these monthly meetings, each junior faculty member is assigned a Mentoring Committee, which is composed of five senior faculty members and follows the yearly progress of the faculty member. The Mentoring Committees are formed before the arrival of the new faculty member and its Members are chosen on the basis of their scientific excellence and scientific overlap with the incoming faculty member. Further, the committee contains at least one member from outside the Department. The Chair of the Department can attend these annual meetings as well. The Assistant Professors meet with their committee members often on an *ad hoc* basis to discuss a number of academic and scholarly issues.

Quarterly Meetings with Associate Professors: Although Associate Professors are often considered senior, they still need and seek guidance on such issues as the requirements to be promoted to Professor, thus the Chair has instituted meetings with each Associate Professor on a quarterly basis at which any issue is up for discussion. To reiterate, most of the Biochemistry Faculty members at all academic ranks take full advantage of the open-door policy, which is often more effective in the sense of timeliness to address a specific issue. Thus, there are several avenues for all members to raise issues concerning science culture with me.

Quarterly Luncheon Meetings with the Non-Academic Staff: The Business Office Staff and Dishwashing and Cleaning Staff are integral and highly respected members of the Biochemistry Department. The Chair now meets on a quarterly basis with the Staff over lunch to discuss their well-being and any concerns that they might have. These meetings are also used as an opportunity to urge all staff members to take advantage of what Duke University has to offer in the way of career advancement and to talk to the Chair or to the Business Manager, if there is something special that she or he has in mind with respect to the operation of the Department or how to achieve a specific individual goal.

Annual Meetings with Principal Investigators: Each year in the Spring, the Chair has a formal one-on-one meeting with each primary faculty member. Prior to this meeting, the faculty member completes a form that evaluates all aspects of their academic performance for that year. This forms the basis of much of the ensuing hour-long discussion. The Chair adds a post-discussion evaluation of each faculty member, signs the form and returns it to the faculty member for his or her signature. The latter signature

does not require agreement with the Chair but rather that she or he has read the evaluation and hence, knows what the Chair thinks about the performance of this individual during the past academic year and acknowledges those suggestions (if any) that will improve the following year's performance. In addition to discussing their scientific and academic achievements of the past year, this meeting also provides the faculty a dedicated time to bring up issues that range from relatively minor annoyances to important concerns. The resolution of these issues is often quick and requires only discussion but other issues often involve a more in-depth approach.

Suggestion/Issue Box: Not everyone is comfortable with confrontation or with meeting face-to-face with persons in authority to discuss a personal or professional issue. Hence, there is a suggestion/issue box located in the Biochemistry kitchen area on the second floor of Nanaline Duke, which is accessible 24 hours a day, seven days a week to all members of the Department. All members of the Department are now able to make suggestions or comments or raise any issue anonymously. Only a handful of issues or concerns have been raised. Further, these few suggestions and raised issues have been quite good in identifying ways in which to make the Department an even better place to do ethical science. Such an approach might seem old-fashioned but it seems to have filled a niche for a several members of the Biochemistry Department.

School of Medicine's Integrity Hot Line: The Chair has made all faculty members aware of the School of Medicine's Integrity Hot Line by discussing this specifically at a several Faculty Meeting and to the entire Department by hanging the associated posters in prominent places throughout the Department.

The current open-door policy shall continue under the current Chair. The Chair will also continue to emphasize the critical importance of generating reproducible data of the highest quality that face up to the scrutiny of peer review and that **ALL** members of the Department of Biochemistry share a responsibility in ensuring that their data are indeed of the highest ethical and scientific quality, which have been generated by all members of their laboratories.