

NYU Biology QBIST T32 Training Program

Annual Report for Advisory Committee

Directors: David Gresham, Christine Vogel
Reporting period: Academic Year 2020/2021

Purpose

This report outlines the progress made in the Quantitative Biological Systems Training (QBIST) Program, funded by NIH T32 training grant GM132037, during the 2020-2021 academic year. The report evaluates successful components and describes improvements for the coming year. Based on this report, the Advisory Committee is asked to provide feedback on priorities and areas of improvement for the 2021-2022 academic year.

Content

1. Summary of program goals
2. Program Activities during the 2020-2021 academic year
3. Planned Activities for the 2021-2022 academic year
4. Appendix 1: QBIST Workshop 2020-2021 syllabus
5. Appendix 2: Role of the Advisory Committee as defined in the grant proposal
6. Appendix 3: Results of the survey on the QBIST internship
7. Appendix 4: Results of the survey on the QBIST workshop
8. Appendix 5: QBIST Workshop 2021-2022 syllabus

Report

1. Summary of program goals

The NYU Biology NIH T32 Training grant started in July 2019. The current reporting year spans September 2020 - August 2021 (Year 2). The 3 main goals of the training program as outlined in the original proposal are:

1. Enable trainees to develop and apply advanced computational and data science skills to complex biomedical research questions.
2. Cultivate trainee skills in mentorship and leadership and provide opportunities for experiential learning through mentorship activities that promote an inclusive environment within the biomedical research enterprise.
3. Enable trainees to actively explore and pursue biomedical career paths outside the traditional academic trajectory.

Progress toward these goals was achieved during the reporting period through three primary activities:

- A. Initiation of the QBIST Workshop attended by all second year PhD students in the NYU Biology PhD program. This workshop comprises lectures on diversity and inclusion, career development, and responsible conduct of research. See **Appendix 1** for the 2020-2021 syllabus.
- B. Mentoring the four QBIST trainees (2nd year of their PhD) to secure an internship position outside academia during the summer following their 2nd year of PhD studies.
- C. Training for all 2nd year PhD students in mentoring with the goal of participating in one of the mentoring opportunities offered at the department (i.e. high school and undergraduate summer research programs).

Note that these goals were modified from the original proposal to reflect funding cuts and the impacts of the pandemic.

2. Program Activities during the 2020-2021 academic year

During the second year of the QBIST program we successfully implemented all aspects of the QBIST program. The QBIST Executive Committee selected four students from a competitive pool of applicants. The Directors worked closely with the trainees over the academic year to prepare them for an internship during the summer of 2021. This included identification of internship opportunities, preparation and refinement of trainees' resumes, writing application letters, and corresponding with contacts at the targeted institutions. Three of four trainees from the 2020 cohort successfully conducted their internships. A fourth trainee deferred his internship until the summer of 2022. In addition, two trainees from the 2019 cohort completed internships that had been interrupted by the COVID pandemic. The results of the post-internship survey are described in **Appendix 3**.

As can be seen in the answers in **Appendix 3**, the internships were overall perceived as very positive experiences that either reinforced or modified existing career plans. Most internships were conducted online and with scientific journals. Trainees noted several positive aspects with respect to insights into interviewing, the inner workings of non-academic institutions, different career paths, the diversity of career options outside academia.

We asked all second year PhD students an anonymous survey and received 9 responses. The results are presented in **Appendix 4**. In comparison to last year (in which most PhD trainees planned to pursue a career in academia), this year's trainees were either not sure or leaning towards industry. Trainees felt that in 2020 they improved the desired quantitative skills in relevant courses. Trainees appeared largely unaware of various skill development courses offered at NYU.

All QBIST course elements received consistently high evaluations with respect to usefulness, with average scores being greater than 4 out of 5 for all but two course elements. Lectures 3 - 8 of the QBIST workshop also fulfilled the requirement for training in the *Responsible Research Conduct* as requested by the National Institutes of Health. The second year of the QBIST workshop also included four new sessions on *Race and Racism in Science*. These sessions were generally perceived very well. Trainees particularly noted a session on Responsible Analysis of Data and suggested expansions on the topic.

All QBIST activities are hosted on the QBIST webpage:

<https://as.nyu.edu/content/nyu-as/as/departments/biology/academics/phd/qbist-program.html>

The **Advisory Committee** remains as originally proposed:

- Susan Anton - Professor at the NYU Department of Anthropology and Acting Dean of the Graduate School of Arts and Science
- Jan Plass - Paulette Goddard chair in Digital Media and Learning Sciences at the Steinhardt School of Culture, Education, and Human Development at NYU
- Liam Holt - Assistant Professor at the Department of Biochemistry and Molecular Pharmacology at NYU Grossman School of Medicine

In response to the **Advisory Committee's** recommendations, we implemented the following additional items:

1. We ensured that the workshop on mentoring/leadership occurred and that students from the prior year's cohort were able to attend
2. We introduced a new module to the QBIST workshop on Racism and Science which included a lecture on the history of racism in science by David Gresham
3. We introduced a new session on Entrepreneurship and Startups presented by the NYU Entrepreneurial Institute to the QBIST workshop
4. We ensured that second year QBIST trainees were able to undertake internships - mostly by seeking remote internship opportunities.
5. We enabled the first year QBIST trainees to undertake internships that were delayed due to the COVID19 pandemic.

3. Planned Activities for the 2020-2021 academic year

Based on the positive evaluation of the QBIST workshop components by the second year PhD students, we will retain the existing workshops. The module on *Race and Racism in Science* will be repeated during the 2021-2022 academic year.

We are planning the following activities in the coming academic year.

1. The QBIST workshop, which comprises 11 sessions as outlined in **Appendix 5**.
2. Increase awareness amongst students for existing writing workshops, such as those offered by the NYU School of Journalism on Science Communication
3. Enable exchange between past and current QBIST trainees on securing an internship and having a successful internship experience
4. Support QBIST trainees to identify and undertake internships

Note, that plans for the 2022 implementation of the *Racism in Science workshop* are not yet finalized and will be organized by the Directors of DEI in the Departments of Psychology and Biology.

Note, that effective September 2021, Christine Vogel has taken on the role of Director of Graduate Studies in the Department of Biology. Christine will continue in her role as co-Director of the QBIST program.

4. Appendix 1: 2020-2021 QBIST Workshop syllabus

All sessions were held on zoom.

Session 1: Friday October 3, 3pm

Introduction to the QBIST Workshop
David Gresham and Christine Vogel

Session 2: Friday October 16th, 3pm

Diversity and Inclusion
Fatiah Touray

Session 3: Friday November 13, 3pm

CVs and Interviewing
Kate Rockey-Harris (Director for Graduate Career Development, Wasserman Center)

Session 4: Friday December 4, 3pm

Teamwork, Leadership, and Management
Christine Ponder (Director, Office of Research Affairs)

Session 5: February 11, 4-6pm

Ethical Considerations in Research with Animals
Lee-Ronn Paluch/Mark Klinger

Session 6: February 25, 4-6pm

Responsible Data Analysis, Management and Sharing
Vicky Steeves/Nick Wolf

Session 7: March 4, 4-6pm

Publication Practice
Claude Desplan

Session 8: March 11, 4-6pm

Mentor/Trainee Responsibilities and Collaboration in Science and Conflict of Interest
Chiye Aoki

Session 9: March 25, 4-6pm

Ethical Considerations in Research with Human Subjects and Research Misconduct
Margarette Bolton-Blatt

Session 14: April 9, 3pm

Dee Dao, NYU Entrepreneurial Institute
Biotech Start ups

Session 15: Friday April 16, 3pm

Mentorship and Maximizing Training Experience
Christine Ponder and Christine Vogel

The following sessions comprised the Racism in Science workshop. The workshop was coordinated by Wei Ji Ma.

Session 10; April 15, 4-5:30pm

The history of race as a scientific concept
David Gresham

Session 11, April 22, 4-5:30pm

The impact of science on everyday beliefs about race
Ann Morning, Department of Sociology

Session 12, April 29, 4-5:30pm

Racial and ethnic biases in health care - from slavery to the present
Carolyn Hutson(Mount Sinai, Environmental Medicine and Public Health)

Session 13, May 6, 4-5:30pm

Bias in Artificial Intelligence and Machine Learning
Joshua Loftus (Stern Business School)

5. Appendix 2: Notes on the role of the Advisory Committee

From grant proposal:

Advisory committee assessment criteria

On the basis of the annual report, and discussion with QBIST program trainees, the QBIST program advisory committee will provide critical assessment of the extent to which:

- Program faculty foster the integration of quantitative and traditional biological sciences
- Program faculty are engaged in activities that promote trainee career development
- Program faculty are promoting the adoption of best practices in scientific rigor, reproducibility, and responsible conduct of research
- Trainee/mentor relationships are serving the best interest of the trainee

Protocol for Responding to Advisory Committee Critique

The QBIST program advisory committee will provide a written summary of their assessment of the program that will include suggested strategies for addressing any issues that they have identified. The annual report from the QBIST program advisory committee will be reviewed and discussed by the entire QBIST program executive committee at their annual meeting. Subsequent annual reports by the QBIST program directors will explicitly address issues outlined in the annual report. To promote transparency, the annual QBIST program advisory committee report will be posted on the QBIST web portal.

6. Appendix 3: Results of the QBIST internship survey

The survey had been sent to all 2019 and 2020 QBIST trainees. We received 5 responses.

Please describe the logistics of your internship: online/in person, when, for how long, where, your responsibilities.

5 responses

- In person at the Queens Botanical Garden, three weeks, ... to facilitate the Children's Garden Summer Camp.
- Online, for 3 months at Nature Genetics. I wrote two press releases, research highlights for two months' issues of the journal, and weekly/biweekly (it varied) bioRxiv highlights for the editorial team. I also pitched and wrote four blog posts, edited by my supervisor Catherine Potenski, for the Nature Ecology and Evolution community site, where I will remain a contributor.
- 6 weeks full time (40 hours/week), fully online at Nature Communication - I "shadowed" editors and learned about the editing process, presented on research and papers that would be a good fit for the journal, wrote a research highlight for lay audiences, helped organize a Q&A piece, helped with the journal Twitter for a week, gave feedback on the design of several workshops aimed at early career researcher, and helped the editors with any other projects that came up.
- 6 weeks (July-September), primarily online (1 in-person visit), assisting with the development of iCurate, a machine learning program for identifying herbarium specimens. Specific role involved collecting and curating sequences across land plant species for constructing a phylogenetic tree for the loss function. Also wrote a science outreach article aimed at children titled "What is a seed?", including images from the NYBG specimen collections.
- I had an internship setup. However, due to the pandemic, it was cancelled.

Please describe what you learned from it that helped you in your career planning. Which aspects of your internship helped you confirm (or change) your current career goal?

5 responses

- While there is always more to learn about teaching, I had a chance to utilize the teaching experience I'd gained at BioBus outside of BioBus and learned that I've already honed the skills I'd wanted to gain when I'd first started performing science outreach.
- For a while now, I have leaned toward science journalism as a career goal, and actually see my PhD as a path toward that, rather than a detour The internship helped me also see an editorial career as a viable path, as that also involves navigating and curating a broad array of science, similar in some respect to science journalism.
- I think what I mainly got out of the internship were the people I met along the way. ... helping me with my writing by providing feedback on articles I send her. She also introduced me to ..., a journalist at Nature Methods, who has spent hours informally teaching me (by phone, email, feedback on writing) about the mechanics of science writing, and continues to be in touch about opportunities in science writing (publications to pitch to, people to talk to etc.). The whole editorial team at Nature Genetics held a kind of Q&A/career day session for me, which gave me new perspective on editorial jobs, and on what I would need to do to prepare for such a career.
- Spending a fair bit of my time working with a broad range of research topics reinforced that I enjoy reading about all sorts of science and work well with a broader scope than is typical in a PhD. I also

really benefited from having lots of different things to work on at any one time, rather than the structure of a PhD (or academic research generally), where the whole point is to dig in really deeply to a small set of questions. It solidified the fact that I will most likely not be pursuing a career in academia after my PhD.

- I learned a lot of skills and knowledge from the main project, including how machine models are constructed, understanding Perl scripts, utilizing advanced NCBI resources and tools, querying and curating very large datasets, and how to construct very large phylogenetic trees, that will be very useful in my future research in plant evolution. The process of writing the outreach article helped me learn more about the types of collections available at the garden and was very good practice both for breaking down and explaining science topics in simple ways and also reminding me of the broader aspects of these research topics that make them exciting for me and general audiences. I also enjoyed learning about new opportunities for engaging in science outreach with the public. My experience working with NYBG was very positive and I would certainly consider working for that type of non-profit institution in the future.
- I learned a bit about networking. I also learned a lot about the interview process and the opportunities that are present for someone with my background. I think that because I was able to talk to some of these companies directly I have made soft-contacts that may be helpful if I transition into industry.

What was the most surprising aspect about your internship?

5 responses

- I learned I am no longer interested in pursuing science education or science outreach as a career--a huge shift from when I originally began my PhD.
- The entire Nature Genetics editorial team being just six people was a bit of a shock. But it seems like an awesome environment to work, with lots of flexibility, independence, and collaborative support when needed.
- The role of an editor varies quite substantially from journal to journal. Some have the in-house editors handle a majority of the manuscripts, while others rely heavily on editorial board members to do most of the editing, which means the in-house editors also write commentaries and run workshops and participate in the scientific community in other ways.
- The career progression of an editor is also not as straightforward as I thought and the turnover is surprisingly high as people jump between journals or pursue different jobs in science writing/editing/communicating.
- The aspects of the exact details of what I would be working on and how going about that would look like were not exactly what I expected, and certain steps took longer to execute than I thought they would, but I learned a lot from the experience and have no regrets.
- The different styles that these companies operate in. Some were extremely formal and large and others felt very informal and friendly. It made me feel like I could find something that fits my own tastes.

Which aspects of your internship experience could have gone better? How could they have been better (constructive ideas)?

5 responses

- I cannot think of anything.
- ... I would recommend more structure in the form of a weekly/biweekly list of tasks that they know about from the outset.

- It would have been a little easier to help out with the actual editing process in person....The remote setup was otherwise totally adequate and I met with editors quite regularly so I didn't feel isolated or like I had too little work or support. This is a fairly Covid-specific problem, so I don't imagine it will be super relevant in the future.
- It was unfortunate that it got cancelled because the company both moved physically and changed their operations so radically.

Overall, what would your advice be to the next generation of QBIST trainees about the internship experience?

5 responses

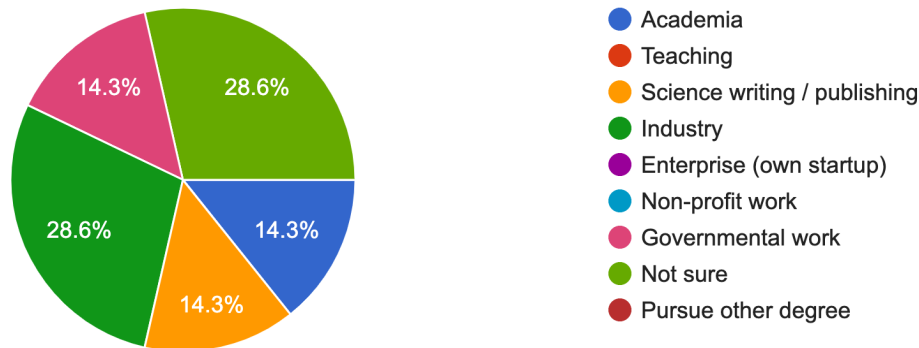
- Don't be afraid to consider quitting if you know you're not going to grow in the place you are in.
- Start looking for internships early, and cast a really wide net. Like with most things in life, you are likely to mostly get rejections, so recognize that it's a numbers game. Be a machine, write a hundred emails.
- Once you're in, don't be shy. The person supervising you will probably have tonnes on their plate already, so take the lead and probe about things you could possibly do, rather than waiting for instructions.
- Obviously it depends on their goals, but I really enjoyed my non-research internship. It allowed me to see that there are many ways to still be part of the scientific community without actually being in the lab. I would recommend an internship that allows QBIST trainees to engage with science from a different angle than they are used to.
- It's definitely worthwhile to have the opportunity to explore science careers and environments outside of academia. Take the chance to learn as much as possible and enjoy yourself. :)
- Look for smaller companies. They are more likely to see what a unique opportunity this is and give you a chance. Some of these companies are small enough that you could comfortably be in direct contact with the CEO.

7. Appendix 4: Results of QBIST Workshop survey

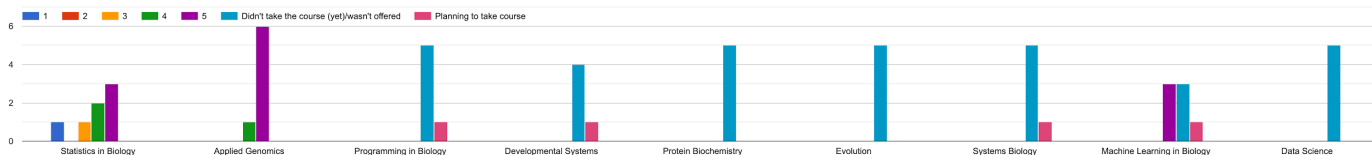
The survey had been sent to all participants of the QBIST workshop 2020/2021. We received 9 responses. Excerpts are below.

At the moment, what is your career goal after finishing your PhD? Note that this does NOT include post-doctoral time (i.e. you could do a post-doc regardless of your career choice after that).

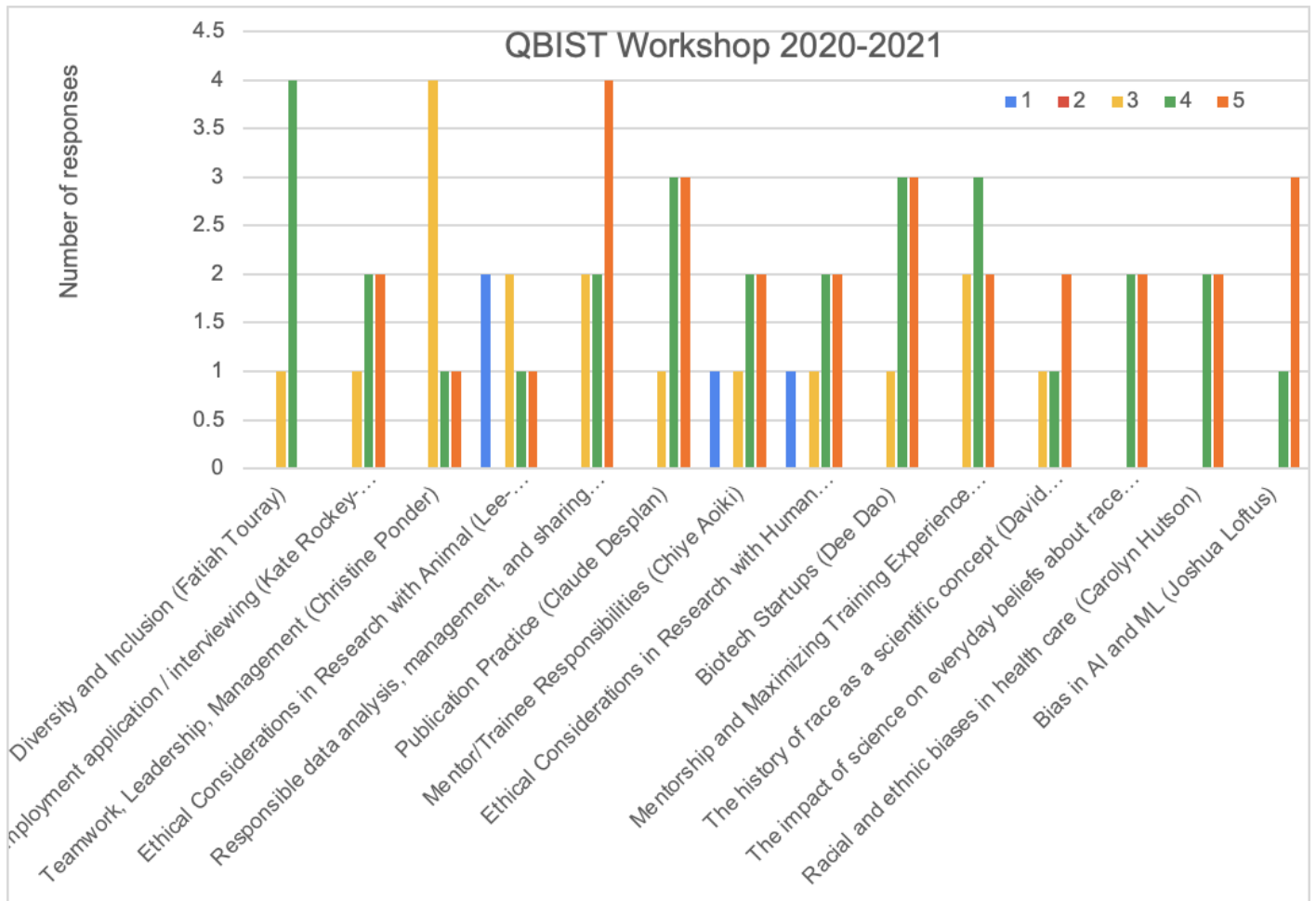
7 responses



Which courses have you taken so far and how useful were they? (1 not so useful, 5 very useful) Which courses are you planning to take?



From a scale of 1 to 5, please rate how useful the following QBIST workshop components were (1 = not very useful, 5 = very useful, NA = did not attend or do not remember). "Useful" in the broadest sense.



Which kind of QBIST workshop components would you love to see in the future? 4 responses

- The data management and sharing workshop was immensely helpful - DEFINITELY continue that one for future students (and the earlier in the year the better). In general I preferred skills/research practices-oriented workshops.
- expose students to even wider range of possible jobs other than academia or industry. For students who don't want to do academia or work at a biotech company. What other roles are there? For example, governments jobs or administrative jobs.
- Maybe a science journalist-led one.
- I loved the workshop Vicky ran. It was incredibly useful—I wish we had her come and speak to us during Art of Scientific Investigation. As for future workshops, what about a 'Design Your Life' Workshop, like the one given at Stanford?

5. Appendix 5: QBIST Workshop 2021-2022 syllabus

Session 1: Friday October 15, 12.30-2 pm

Introduction to the QBIST Workshop
David Gresham and Christine Vogel

Special Session: Friday November 5, 12.30-2pm

Academic Careers at a Liberal Arts College
Professor Gabriel Persson (Bard College)

Session 2: Friday November 19, 12.30-2 pm

CVs and Interviewing
Kate Rockey-Harris (Director for Graduate Career Development, Wasserman Center)

Session 3: Friday December 3, 12.30-2 pm

Teamwork, Leadership, and Management
Christine Ponder (Director, Office of Research Affairs)

*The following sessions are part of the Responsible Conduct in Research Training.
These sessions are coordinated by Jane Lee (jl381@nyu.edu) - Thursdays, 4 pm*

Session 4: TDB Spring 2022

Ethical Considerations in Research with Animals
Lee-Ronn Paluch/Mark Klinger

Session 5: TDB Spring 2022

Responsible Data Analysis, Management and Sharing
Vicky Steeves/Nick Wolf

Session 6: TDB Spring 2022

Publication Practice
Claude Desplan

Session 7: TDB Spring 2022

Mentor/Trainee Responsibilities and Collaboration in Science and Conflict of Interest
Chiye Aoki

Session 8: TDB Spring 2022

Ethical Considerations in Research with Human Subjects and Research Misconduct
Margarette Bolton-Blatt

Session 9: April 8, 12.30-2 pm

Dee Dao, NYU Entrepreneurial Institute

Biotech Start ups

Session 10: Friday April 15, 12.30-2 pm

Mentorship and Maximizing Training Experience

Christine Ponder and Christine Vogel

The Racism in Science workshop will be held in 2023.

The workshop is coordinated by Professor Emily Balcetis, Department of Psychology.