**Training Environment and Professional Development Boilerplate**

**for BBSP-affiliated T32 and R01 Grants**

***Background:*** Traditional PhD programs in the biomedical sciences have been geared toward a singular goal: to train the next generation of academic researchers. However, employment options for life science PhD graduates have changed dramatically over the last 30-40 years. According to the 2006 Survey of Earned Doctorates conducted by the National Science Foundation, only 14% of PhDs in the biological sciences have obtained a tenure-track position in academia within 5-6 years of earning their doctoral degrees. During this same time the number of PhDs earned in the life sciences has steeply increased since the doubling of the NIH budget that occurred between 1999 and 2003.

In 2005, UNC-Chapel Hill responded to these concerns by creating the Training Initiatives in Biomedical and Biological Sciences (TIBBS). The TIBBS program provides career awareness and professional development programming for more than 500 life science graduate students. TIBBS is housed in the Office of Graduate Education (OGE) along with the Biological and Biomedical Sciences Program (BBSP), the umbrella recruiting and admissions program for the biomedical sciences at UNC. The goal of all TIBBS programming is to develop well-rounded, professional scientists who excel during their graduate training and secure the position of their choice following graduation. TIBBS strives to raise career awareness, teach the skills that are required for success in a variety of career paths, and provide support and training to help graduate students achieve career satisfaction. By providing internships and professional development support to UNC graduate students, TIBBS also plays a critical role in recruiting top students to UNC-Chapel Hill.

In 2015, in recognition of past successes in creative leadership and innovative career development ideas, UNC was one of only 17 institutions selected as an NIH Broadening Experiences in Scientific Training (NIH BEST) Consortium awardee. Professional development programing was expanded through the NIH BEST initiative to include experiential learning opportunities including internships and site visits. TIBBS is an active participant in identifying best practices in graduate professional development as part of the mandate of the NIH BEST consortium (including collective program evaluation nationally). In 2020, the ability to enhance our systematic program evaluation efforts included a Science of Science Policy Approach to Analyzing and Innovating the Biomedical Research Enterprise (SCISIPBIO award) focusing on professional development, mental health and wellness, and mentoring. Establishing the PhD Integrated Research on Education and Career Training Lab (PhDIRECT Lab) has allowed for on-going evidence-based evaluation of best practices in biomedical graduate education and training.

One major program that was initiated as part of the NIH BEST award was the Immersion Program to Advance Career Training (ImPACT), which is now funded by UNC. ImPACT continues to provide 160-hour paid internships for 25 graduate students each year. To date, more than 200 interns have been placed with over 70 local employers in the government, non-profit and corporate sectors. Many internships are in the research and development realm, but others are available to trainees interested in science writing, science policy, teaching, outreach, program administration, business development, etc.

TIBBS also hosts industry site visits for trainees with some of our industry partners in collaboration with the RTP-centric Enhancing Local Industry Transitions through Exploration (ELITE) Consortium. This local collaborative program provides monthly activities co-organized by partners institutions. The mission of the ELITE Consortium is to connect companies that hire PhDs with PhD students and postdocs from the National Institute of Environmental Health Sciences (NIEHS), the University of North Carolina at Chapel Hill, and Duke University. ELITE helps trainees explore industry career options through site visits to leading Research Triangle Park, NC, life-science companies, and to other employers beyond the traditional tenure-track (e.g., University-operated contract research organizations. Site visits allow trainees to learn about the different types of industry jobs open to PhDs and how best to prepare for them. These visits also provide an excellent opportunity to network with industry professionals, and to experience company culture first-hand. ELITE also benefits participating companies, who can gain positive exposure among PhD trainees and identify talent for future hiring.

In a typical academic year, TIBBS provides more than 60 career awareness and professional development events. These events are attended by more than 1000 registrations over the course of a year. Registrants included graduate students, postdoctoral scholars, undergraduates, faculty, and staff, and these registrants came from a variety of departments and curricula. On average, more than 85% of graduate students in BBSP-affiliated programs annually take advantage of at least one TIBBS professional development and career awareness events. Although funded by TIBBS, many of these events are planned by trainees in Career Cohorts that are focused on specific career options. More about Career Cohorts can be found below.

***Annual TIBBS Programming*.** TIBBS provide a core set of annual programs that are supplemented by smaller workshops and events on an as-needed basis. Some of the annual programs include the following:

* *The TIBBS Career Blitz*. Regularly drawing 150+ registrants, the Career Blitz is our most popular career awareness program. The event is a three-hour opportunity for UNC graduate students and postdoctoral scholars to network with dozens of PhD scientists from 20 different career fields. Attendees learn about a variety of career paths for scientists and have the opportunity to network with scientists from these career fields. The Career Blitz has been a virtual event since the COVID pandemic which allows more trainees and more science professionals from across the US to participate.
* *The TIBBS Postdoc Boot Camp*. This series of events is designed to help senior graduate students think about their potential postdoctoral training as a stepping stone to their future career, whether that may be in academia or in another career field. The boot camp includes 1) a keynote address by a prominent advocate for postdoctoral training, 2) workshops on writing cover letters, preparing a CV, and thinking strategically about your postdoctoral training, and 3) two panel discussions, including one with current postdoctoral scholar panelists from industry, government, teaching postdoctoral programs, and academia, and one with faculty panelists from academia and government. This event includes the interest, value, and skills assessments from the online myIDP tool and can also help graduate students decide whether postdoctoral training is a suitable fit for them.
* *TIBBS Career Workshop Series*. These series are geared toward closing the skill gap for students and postdoctoral scholars who have already chosen their desired career path or are looking for more information to determine whether a career is a suitable fit for them. We generally present 2 workshop series per year and rotate among these topics: 1) Teaching Skills Series, 2) Science Policy and Advocacy Series, 3) Industry Skills Series, 4) Science Communications Series, 5) Medical and Regulartory Affairs Series, and 6) Academic and Research Intensive Career Series. Each series consists of 6-8 workshops that are 1-3 hours in length, typically 1-2 per week over a 6-8 week period, or 1-2 per month spread across a semester. We draw on local and regional experts, successful career leaders, and other recognized speakers for these events. We also offer an annual Consulting Bootcamp in collaboration with the Accelerate to Industry (A2i) program, career cohorts, and local consulting firm partners.
* *Grant Writing Workshops*. TIBBS presents workshops throughout the year tailored specifically to the NIH F31 and NSF GRFP and strategically scheduled to coincide with application deadlines.
* *Science Outreach and NC DNA Day.* TIBBS also provides teaching and science outreach opportunities to interested trainees. This is done primarily through NC DNA Day, which is an annual event that matches trainees with a NC high school science teacher. Trainees share their experiences and passion for science with that teacher’s classroom and the high school students acquire knowledge about scientific careers and issues important to society. Since 2007, 1200+ volunteers with NC DNA Day have visited more than 500 unique high schools, 4200 classrooms, and talked to over 100,000 students!
* *Career Cohorts.* TIBBS helps graduate students and postdoctoral trainees organize into peer led groups with a common career focus. Career cohorts receive funding from TIBBS and plan many of their own activities. Our 6 career cohorts consist of: the Graduate Business Careers Club; MedRac@UNC (medical and regulatory affairs); the Science Policy and Advocacy Group; Science Writers and Communicators; Future Science Educators; and Academic and Research Intensive Career Association. Group size ranges from 30 to over 80 members. There are no constraints on the number or size of groups, which enables us to respond quickly to new career trends and interests from trainees.
* *Affinity Groups.* TIBBS also sponsors trainee clubs that focus on supporting and developing trainees from various groups with tailored events around professional networking, community-building, and career development, including the Society for Black Biomedical Scientists (African-American scientists), Middle Eastern and North African Scientists, Global Perspectives in Biomedicine (international trainees), STEM Pride (LGBTQ+ and allied STEM students and professionals), Women in Science (women-identifying scientists, including an annual symposium), and a student chapter of the Society for the Advancement of Chicano/Hispanic and Native American Scientists (for indigenous and Latinx trainees);.
* *Wellness.* TIBBS takes a holistic approach to professional development and believes in developing the whole person, including support of trainees’ mental health and wellness. Our OGE Wellness Committee provides support and runs events to enhance visibility of and improve wellness for our trainee community. TIBBS co-sponsors regular events with the Wellness Committee focused on topics such as mindfulness, journaling, and reducing stress, and provides information for accessing resources available to them such as an embedded licensed clinical social worker who works exclusively with BBSP students to support them with their mental health Trainees who are struggling with anxiety, depression, adjustment, relationships, and other concerns can meet with the therapist up to 6 times for free. Referral to community mental health services is also available.

***TIBBS Services*.** In addition to regular career awareness and professional development programming, TIBBS provides a number of other services and support affiliated groups, as follows:

* One-on-one career coaching, individual development plan (IDP) meetings, and CV/resume review with Dr. Rebekah Layton or Dr. Patrick Brandt – this can support trainee goal-setting, career exploration and preparation, job material review, and other individualized trainee coaching priorities.
* TIBBS website content, which includes:
  + A Career Center section with career white pages, CV/resume advice, career trends, and recorded content from past career exploration events.
  + The TIBBS affiliated blog, the Pipette Pen, produced and edited by our trainee-led Science Writing and Communication Club
  + A Resources section with successful examples of grants and other relevant information for scientists-in-training
* Ample writing opportunities to help students gain experience in written communication, including opportunities to contribute to the Pipette Pen Blog.
* Regular communication of job openings, professional development events, and other opportunities through the TIBBS listserv, which reaches over 1000 graduate students, postdoctoral scholars, faculty, staff, and alumni.
* The TIBBS Advisory Board, which consists of graduate students and postdoctoral scholars who work together to promote professional development among their peers and advise and assist with various TIBBS initiatives. Board members gain experience in committee work, leadership, program administration, and professionalism, and the tireless efforts of these individuals have been critical to our ability to expand and improve our TIBBS programming. An Experiential Leadership Certificate is available to student leaders who complete a year of club service and leadership training as part of their TIBBS Advisory Board participation.

***TIBBS Staff.***As Director of Professional Development Programs, Dr. Rebekah Layton is a trained Professional Certified Coach (PCC) and Certified Mentor Coach (CMC). Dr. Layton provides career awareness and professional development workshops, networking opportunities, small group career exploration sessions, and one-on-one career coaching for biomedical graduate students and postdoctoral scholars. She also provides support during the job search and application process, including CV and resume reviews and consultations on job application materials. She is also the Co-Director for the Certificate in College Science Teaching Program. She serves as the PI on the SCISIPBIO R01 award as a part of systemic exploration of best practices in biomedical graduate education, training, and workforce development and directs research in the PhD Integrated Research on Education and Career Training Lab (PhDIRECT Lab). She is a published author on more than a dozen empirical articles on graduate career education and training and a contributor to Inside Higher Education’s Carpe Careers advice column for trainees. She had been awarded the Academy of Educators Scholarship Award (2023) and the Gwendolyn Harrison Smith Honorary Community Award, UNC GPSG (2021).

Dr. Patrick Brandt, Director of Career Development and Outreach, directs the ImPACT internship program and the T32-funded Certificate Program in Translational Medicine. He is a frequent presenter at TIBBS IDP workshops and grant writing workshops. He has helped hundreds of trainees develop non-bench competencies, has assisted students as they proactively investigate career options, and he advocates for the career success of our PhD graduates in whatever path they choose to follow. He serves on the Steering Committee for the American Association of Medical Colleges (AAMC) Graduate Research Education and Training (GREAT) group and an author on numerous peer reviewed studies related to best practices in graduate student professional development.

TIBBS staff are members of the Graduate Career Consortium (GCC), the AAMC Graduate Research Education and Training (GREAT) group, and Broadening Experiences in Scientific Training (BEST) Consortium. They contribute to the national dialog surrounding the future of the biomedical workforce. Dr. Layton and Dr. Brandt are trained in internal program evaluation and TIBBS programming is evaluated continuously to ensure that students’ career and professional needs are met. Dr. Layton also provides program evaluation support to affiliated BBSP Training Programs, and assists Program Directors in creating and adjusting evaluation plans, as well as analyzing and interpreting data/responses. A joint program evaluation resources were developed across campus T32s and R25s as part of a funded- NIGMS Program Evaluation Supplement (Developing evidence-based resources for evaluating postgraduate trainees in the biomedical sciences; McLaughlin et al, 2023, PLOS ONE).

The OGE continuously tracks and analyzes recruiting outcomes, student productivity and degree completion, and alumni career placement and is committed to publishing this information regularly. UNC is a leader in transparency in graduate education and career outcomes of doctoral and post-doctoral trainees in the life sciences, as a member of the NIH BEST Consortium and a member of the Coalition for Next Generation Life Sciences Coalition (CNGLS). Dr. Brandt and Dr. Layton are have also published as part of a national collaborative effort to develop career taxonomy guidance to further this aim.

***Trainee Testimonials:*** Scholars show overwhelming support of the TIBBS program:

*“TIBBS has helped me to recognize areas of my professional development that need to be improved to prepare myself for the career that I am interested in pursuing.” –****UNC graduate student***

*“I found TIBBS helpful because it got me started thinking about career paths early and provided me with great resources to investigate and determine a career path for myself.” –****UNC graduate student***

*“TIBBS was instrumental in my graduate experience and success…TIBBS programs such as the Summer Series on Pedagogy and the Postdoc Boot Camp were important events that aided in my professional development as a graduate student and helped me explore potential career opportunities. Additionally, the expertise of TIBBS staff members helped me to prepare application materials for my job search. Furthermore, my participation in the TIBBS Advisory Council…contributed to my project management experience, which helped me to secure my current position.” –****UNC graduate alum***

[NOTE TO GRANT WRITERS: Sample flyers for the Career Blitz, Postdoc Boot Camp, and TIBBS Workshop Series are available upon request. Although links are not allowed in NIH grant applications, below are some relevant links to help faculty better understand TIBBS services:

* TIBBS Website: https://tibbs.unc.edu/
* ImPACT internships: https://tibbs.unc.edu/internships/
* PhDirect website: https://tarheels.live/phdirectlab/
* T32 Program evaluation resources website: https://tarheels.live/t32programevaluation/
* T32 Program evaluation publication: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0278297
* Career Outcomes dashboard: https://tibbs.unc.edu/career-outcomes-research/
* CNGLS website: https://nglscoalition.org/