

Graduate Industrial Trainee Program at NCSU

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Abstract

The NCSU Graduate Industrial Trainee (GIT) program is a partnership with industry for the purpose of broadening graduate statistics education to include a mentored, first-hand experience in statistical practice. This departmental enterprise that has evolved over a 20-year period is accomplished by placing graduate students in trainee positions at partner organizations. Unlike traditional cooperative education programs and internships, Graduate Industrial Trainees remain full-time students and complete their academic programs on schedule.

Keywords: traineeship, partnering, NCSU

1. History

The partnership to be described developed as a departmental enterprise that evolved over a 20-year period called the Graduate Industrial Trainee (GIT) program. In the early 1980's faculty in the department had professional contacts and collaborations with statistical colleagues at companies and government units in or near the Research Triangle Park, a successful planned research park located within a short drive of the NCSU campus. The concept of an industrial trainee emerged almost simultaneously at three locations in RTP: Burroughs-Wellcome (a pharmaceutical company that later merged with Glaxo), Glaxo (that has evolved into the current GlaxoSmithKline), and the USDA Forest Sciences Laboratory. Through faculty contacts, the NCSU Department of Statistics entered into an agreement with each of these sites to host a graduate student as an intern during the regular academic year. The students worked on-site under the supervision and mentorship of practicing statisticians on a variety of projects.

The department first viewed this as a means of extending its limited financial aid resources. After the completion of the first few GITs, it became obvious that both the students and the host units valued the experience and that each benefited significantly. The pieces were falling into place. We came to recognize that this was a win-win-win situation for all parties, the student trainee, the company and our department. In

the past 20 years, the NCSU GIT program has made over 100 placements.

2. Program Description

The department's Graduate Industrial Trainee program is designed to broaden the graduate level education of a statistician to include a mentored, first-hand experience in statistical practice. This is accomplished by placing interested graduate students in trainee positions at partner organizations. Unlike traditional cooperative education programs and internships, Graduate Industrial Trainees serve throughout the academic year (and over the summer) while remaining full-time students and completing their degree programs on time. Of course, the proximity of NCSU to the Research Triangle Park increases the opportunity for maintaining the program.

Participating graduate students commit to spending two days per week on-site at the partner organization. Appointments are generally made for a 12-month term, and in some cases are extended to 24 months. On-site trainee supervisors/mentors are almost always statisticians, and in many cases alumni of the Department of Statistics or adjunct faculty. Faculty advisors maintain contact with GIT mentors to ensure that all parties are satisfied with the progress of the trainee and to take early action in case problems arise. GIT mentors understand, and concur, that a traineeship is not an opportunity for their organization to acquire inexpensive labor, but rather is an extension of the educational process. In addition, mentor/supervisors understand that at times graduate students require extra time, for example, to study for their preliminary written exam or to prepare and take final examinations, and that this time should be granted. Work should offer a learning experience and encourage skill building in technical as well as non-technical areas. Trainees serve in real work environments alongside professionals who work on problems of substantial financial, practical or social significance. They experience first hand the realities of the private and/or government sector.

As trainees, graduate students may be involved in a variety of different activities. What each trainee does depends in part on where they are assigned and who is

their mentor. Given the length of the appointments, trainees are able to acquire a working knowledge of the kind of work that goes on in their unit and can become a contributing member. Trainees are often assigned to work on projects that have a foreseeable endpoint so that by the end of their appointment they have a sense of accomplishment.

The nature of the projects trainees work on vary and may include some or all of the following types of activities: hands-on data analysis, writing computer code for new statistical procedures, development of new procedures or adaptation of existing ones, delivery of formal statistical training to scientific staff, serving a member of a team, and statistical consulting with scientific staff. Projects require written reports and oral presentations. Activities may contribute to the units work load or may have the goal of bringing new methodologies to the unit for future use.

Another important benefit to the trainee is the opportunity to work with scientists and professional from other fields. Trainees may work as part of a cross-disciplinary team allowing them to develop their skill in this area and letting them experience firsthand the responsibility it places on them. Trainees benefit by the experience of serving as a member of a cross-disciplinary team and advising individual scientist on aspects of their data-driven problems. As part of this process, trainees communicate their findings in written reports and oral presentations. Learning to work as part of a team and enhancing communication skills is important to the future success in their careers. It helps the department live up to its maxim: *Training Problem Solvers*.

Some GITs participate in joint research work involving their mentor and a faculty member. This model sometimes leads to a dissertation topic, in which case the mentor may serve on the student's graduate advisory committee. This is a very beneficial model and one that occurs with some regularity. However, the department believes that this model is not essential for the success of the program. On the contrary, GITs lacking a collaborative connection to the department also offer great benefits to all involved.

3. Recruitment of Partners

New GIT partners are established through the efforts of the faculty by taking advantage of their contacts in industry and government. Once identified, candidate partners are approached and made aware of the benefits of the program. Prospective partners are provided with several student vitae and invited to

interview the candidates. The details of the granting process are described below.

4. Partners

Following is a partial list of the companies and government units with whom the department has had GIT partnerships: GlaxoSmithKline, SAS Institute, Research Triangle Institute, Becton Dickinson, Burroughs-Wellcome, Nortel, CIIT, EPA, PPD Pharmaco, Triangle Pharmaceuticals Inc., Analytical Sciences Inc., Constella Group, Quintiles Inc., Inspire Pharmaceuticals, Inc, Clintrials Inc., The Raleigh News & Observer, Inveresk, Cuddy Farms, USGS, and the USDA Forest Sciences Laboratory. The GIT program has expanded beyond the graduate program in Statistics to include the program in biomathematics and, most recently, in bioinformatics. The latter has been very successful at establishing GIT partnerships.

GlaxoSmithKline (GSK) has been a GIT partner from the beginning. The partnership started some 20 years ago when a single trainee was placed in the pre-clinical group. Following on that success, NCSU Statistics trainees work in groups throughout GSK, including in the areas of statistical consulting, pre-clinical, drug discovery, chemoinformatics, quality control group at the manufacturing plant in Zebulon, NC, and the data mining group which is housed on the NCSU Centennial Campus. Throughout this period David Cooper, now the Director of Statistical Sciences RTP at GSK, has been a steady and sustaining supporter of the GIT concept and a exemplary mentor to our students.

A relative newcomer to the GIT program, Inspire Pharmaceuticals, Inc (ISPH) located in Durham, NC. Our contact at Inspire, Dr. Lisa LaVange, has enthusiastically embraced the GIT program and what it strives to accomplish. Recognizing the importance of attracting good students to the field and interesting faculty in the statistical problems encountered in the biopharmaceutical industry, Dr. LaVange is teaching a seminar course in our department titled Statistical Issues in Pharmaceutical Research. She has arranged for practicing biopharmaceutical statisticians to present weekly talks on such topics as drug discovery, PK/PD modeling, confirmatory studies, clinical equivalence, etc.

5. Benefits to Partners

GIT partners, and the people with whom the trainee works, benefit not only from the trainee's work products, but also from the conduit this provides to the

faculty at NCSU, and from the opportunity to train and become well acquainted with the abilities of a young professional who will soon be on the job market. Our industrial partners also understand that it is important to attract good young people to the field of statistics and to introduce them to the excitement and benefits of working in a high-quality professional environment. It is no accident that a significant number of our graduate students who served as GITs go on to work for the companies where they served as trainees. In fact, some of these former trainees have established themselves as GIT partners and now serve as mentors themselves.

6. Benefits to the Department

The benefits to the department are substantial. Naturally the department always benefits when they can arrange for their students to participate in a broadening experience. Such broadening of experience and mentoring by local scientists help the department meet some of the important goals of its NSF-VIGRE program. On the financial side, the GIT program provides a significant benefit that allows the department to support more graduate students and while at the same time supports educational enrichment for the betterment of all Statistics graduate students. The existence of the GIT program enhances the recruitment of graduate students permitting us to offer a more diverse set of funding opportunities to prospective students. The prospect of being a GIT during their tenure as a student is attractive to recruits, particularly those who anticipate taking jobs in industry. Finally, GITs often bring faculty and industry statisticians together (along with the trainee) in fruitful collaborations.

The following gives a snapshot of the activities of some students. Student Ramos brought his nonlinear mixed effects problem to Pantula from his GIT at GSK, and student Seongyeon extended this work. Student Jie Zhang has at least one patent application with this mentor, Young, based on his work at GSK. Student Wang's thesis relates to his work while a GIT at GSK. Student Yi's thesis is related to drug discovery and he was jointly directed by Young (of GSK) and Hughes-Oliver. Two other students, Remlinger and Ke Zhang, are working on drug discovery problems as well. Student Wu is currently working with faculty on problems related to his GSK GIT. Genton has a student working as a GIT at GSK under Menius on a problem related to medical records. Several students, Fenner, Gan, Grau, Martell, Chen, Tourkodimitris, Zhou, Gardner, Su, Unal, Mesenbrink served as GITs at Nortel and wrote dissertations

related to their work on quality control and industrial experiment design.

7. Business Model

The basic funding mechanism for the Graduate Industrial Trainee program is for the partner industry to provide funds to the department who in turn provides a stipend and benefits to the trainee.

For each trainee the department submits a formal grant proposal through University Sponsored Programs to the partner organization. The proposal outlines the purposes for the traineeship program adding details pertaining to the traineeship being proposed. In some cases the proposed trainee is identified by name. Once the agreement between the university and the partner industry is complete, the funds are received by the department, and the trainee is formally appointed as a Graduate Research Assistant. The assistantship provides a stipend, full tuition, and health insurance. Stipend levels for GITs are set somewhat higher than those for on-campus research and teaching assistants.

The grant budget includes funds for the trainee stipend, fringe, tuition, and health insurance. It also includes a modest amount for general support of the Statistics graduate program. Because the university overhead policy recognizes that this is an off-campus activity and primarily involves training, a significantly reduced overhead rate is applied. GIT grant accounts are set up as "fixed price accounts" so that following the project end date the unexpended funds are transferred to a university trust account. These funds can be carried forward and are used to support the Statistics graduate program by paying for such items as graduate student recruiting, computer equipment and infrastructure (benefiting the graduate students), and graduate student travel to professional meetings.

Intellectual property issues are negotiated between university and partner organization specialists. Once negotiated, the agreements serve as model for future agreements with the same partner. Graduate students are often requested to sign a confidentiality agreement.