Training Program and Environment:

Strengths

- This is a long-standing training program that has had a significant impact on training in the Biosciences at Stanford catalyzing the formation of an integrated training program but yet providing students with similar interests opportunities to interact.
- The training program continues to be updated and to innovate. The Committee on Graduate Admissions and Policy (CGAP) is working to standardize activities across all 13 Home Programs in the Biosciences moving for earlier qualifying exams, more frequent committee meetings.
- There is some variability in coursework as students on the training grant are in different Home Programs, but all students supported by the training grant follow the same curriculum regardless of the Department of their mentor (and they all take the Foundations course).
- Coursework and research provide opportunities for trainees to learn contemporary science relevant to the aims of the program.
- The program offers a wide variety of courses and the list of courses seems appropriate for the program. Trainees must take a total of seven courses over the first two years.
- The resources available to the students are impressive. The students benefit from the broader training environment at Stanford but are united by the training program within the Department.
- The institution is committed to the program, and provides funds for trainee travel, research assistantships, graduate fellowships, individual career counseling, networking opportunities, and contributes to student insurance and student stipends.
- Addition of career mentoring a good idea in the present climate.
- The training specific activities include a welcome lunch where they are informed that they are on the training grant and what is required, a requirement to present each year (after year 1) at the annual program symposium, and regular lunches with member of the executive committee and some additional trainees. Overall these activities are appropriate.
- The good relationship between students and their advisors was very evident. There are also good interactions within the department, with many opportunities for informal and formal discussion of science (e.g. pizza talks). Students were well connected with other faculty both in their research and in mentoring.
- Advisory committee meets with student’s first and second year to help with rotations and class scheduling. Coaches (2 different faculty members) meet with trainee once a month to help guide research and set up qualifying exam.
- All mentors have fewer than seven graduate students.
- Steering committee ensures that trainees meet all requirements of participation in the program. One member of steering committee sits in on student thesis committee.
- Very positive feedback on the 3-day retreat, which is well-attended by both faculty and students, and serves as a good venue for student presentations and sharing of ideas.
- The program provides opportunities for trainees to be involved in interdisciplinary research.
- Close interactions with industry in part through the SPARK program provide these students with optimal experience in this area. A number of students take advantage of this opportunity.
Weaknesses:

- Students are currently supported for three years including Year 1. Assignment to the training grant before students even begin rotations, much less select a lab, could mean that an occasional mistake is made in selecting a student that may either opt out of the program or affiliate with a lab not well-aligned with the program interests. Although a technical concern, these do not seem to have been major issues. There are a few students who have left the program after receiving TG support or have been switched to a different training grant. While numbers are fairly small, such situations could possibly be avoided if students were appointed a bit later with more information to consider.
- The Program Director describes quantitative courses as an option for trainees but it is not clear how this is tracked to ensure all trainees have a solid quantitative background.
- Due to the interdisciplinary nature of the program, faculty may overlap with other training programs. This may be a problem with faculty not necessarily dedicated to this program but just using it as a source of additional funding. The training grant lacks identity, as the only added value the PI’s could mention was the RCR training mandated by NIH.
- The program does provide some interdisciplinary research opportunities.
- The process for becoming a trainee was essentially random. These traineeships should be seen as an honor to the student as well as the training environment. The selection process should be competitive.
- The career development plan is a weakness. The application describes the plan as instruction in writing, presentations, optional teaching and advising on job opportunities in the Bay Area. However, Stanford does appear to have a solid career center and the program does appear to invite speakers to talk about career options. This should be emphasized.
- It is not clear there is a mechanism for direct student feedback.
- There are minimal if any training grant-specific activities. The Training Grant is merely seen as a source of stipend support. Students should really view the training grant as an extra level of training and there should be responsibilities associated with being a training grant-supported student.
- All students are required to write an NSF grant and many are successful, which is outstanding, but very few other grants are held by these very outstanding students.

**Training Program Director/Principal Investigator (PD/PI):**

Strengths

- The program has undergone a leadership change after a previous professor served as PI for over 25 years. The new program PI (aided by a co-PI) has the program well in hand. The current PI has been in charge since the previous renewal so has several years of experience. The co-PI has been on board for over 10 years, also.
- The PI is an excellent choice to direct this long-standing grant. The PI has a long history of outstanding student training and various services that enhance training. The PI has played major roles recently in designing undergraduate courses and also served in an education capacity for ASCB. The co-PI is an HHMI investigator who also has significant commitment to training.
• Both PIs are well-funded with excellent records of accomplishment and excellent training records. The transition seems to have been uneventful and timely as updates and innovations have been implemented with this new leadership.
• The Program Director has mentored more that 20 pre- and postdoctoral trainees, and has an excellent scholarly record.
• The PD will commit 10% effort to the program and the Co-director will commit 5% effort, which seems appropriate for their described roles.

**Weaknesses**
• Some faculty get an excessive fraction of TG slots.
• Some have a very bad track record of graduating students in a timely manner.
• There is no explanation of the duties of either the director or co-director, only that the director is responsible “for all aspects of the Training Program”.
• Faculty generally did not include any information on their training record in the Personal Statement provided on the biosketch. This is a missed opportunity to describe the training strengths of faculty in the program.
• Junior faculty were unclear about what specific responsibilities are required to be training grant faculty. Responsibilities fall under the role of the Department.
• There is concern, also raised in the initial review, that the PI may have too much administrative responsibility as the Chair of the Department. It is unfortunate that another senior member of the faculty was not chosen to serve as PI of the Training Grant.
  o Note from Stanford: Address each part of the review in your resubmission!

**Preceptors/Mentors:**

**Strengths**
• Mentors are the highly accomplished researchers who are leaders in their fields and also have strong training records and obvious dedication to mentoring.
• The program includes over 50 training faculty from 5 different departments. This is more than sufficient to support the requested training grant slots.
• Training faculty consists of assistant, associate, and full professors with a variety of backgrounds. Among the faculty listed there is a balance of junior and senior faculty, and all mentors are well-funded. Junior faculty members are also given a senior faculty mentor.
• Professors that are no longer active in research are removed from the pool and new professors are added periodically.
• All mentors have fewer than seven graduate students to ensure time to mentor trainees. Mentors are also active participants in program activities and interact regularly with graduate students.
• Mentors that do not graduate students in five years or less have been dropped from the program.

**Weaknesses**
• Junior faculty members were unclear about what specific responsibilities are required to be training grant faculty. Most duties occur in the context of the broader Biosciences umbrella
or in their own home program than specific to the Training Grant. There is also some concern about junior faculty not having previous training or more senior mentors to help them implement the aims of the program.

- Methods did not seem to be in place to assess faculty in a systematic way. Faculty members are primarily added to the training faculty through mentoring a student (if not in one of the core departments). There is no mechanism in place to assess whether such faculty should remain as training faculty or whether other faculty members are fulfilling training responsibilities.
- 27% attrition for TG students.
- 6.9 year average time to graduation for TG students; some specific cases could have benefitted from a more proactive policy.
- One trainer’s lab has several students who graduated quickly (one in fewer than 3 years) but they remained as postdoctoral fellows at Stanford.
- Several of the affiliated departments have only one faculty participant so that the interdisciplinary options are limited.
- Several mentors (including the co-director) have students that have been in the program for more than six years. Several of these may include cases of hardship or other extenuating circumstances but these are not explained in the application.

**Trainees:**

**Strengths**

- Trainees are universally outstanding with excellent grades and accomplishments upon entering the program and continued success throughout training.
- Trainees are very well-spoken with excellent grasp of the ideas underlying their projects.
- Trainees typically publish very high profile papers reporting a significant finding during the course of their training.
- Outcomes for most students are outstanding with former trainees in positions in academia and industry and many recent graduates in high profile post-doctoral positions.
- The recruitment plan attracts a large and very strong applicant pool from a variety of institutions.
- The application addresses plans to recruit and retain minority students and students with disabilities. Faculty attend conferences that attract URMs, Stanford has an undergraduate summer research program that attracts applicants with diverse backgrounds (SSRP), and the STANDOUT program invites faculty and administrators who work with URMs to a two-day conference to talk about their graduate programs.
- There is a well-defined admissions policy and students are allowed to meet with a variety of faculty that are associated with their interests.
- Students are supported for 3 years but this will change to two years for this application.
- The Program Director proposes to increase the number of admitted students in the future.

**Weaknesses**

- A few training grant-supported students do not complete training or left with a Masters. This is a danger of appointing students in the first year of training. There are, however, a very large number of trainees, so 100% retention is not a reasonable expectation.
• A few trainees graduate before a first author paper is published. This concern is minor as it largely reflects the desire to publish a significant piece of work and the time this takes in the current environment.
• The low number of students admitted into the program is a concern given the current number of training grant slots. Training grant slots may not be competitive if most TGE students are able to secure TG funding.
• The time to degree, specifically for Training Grant-supported students is long, 6.8 years compared to an average of 5.7 years for the overall program.

Training Record:

Strengths
• Most students complete important projects and publish in top journals. From a total of 94 trainees there were 276 publications with trainees having been first author on 142.
• Many students supported by the training grant go on to become leaders in their fields, and obtain scientific positions including academic, industry and teaching. Several trainees have taken advantage of the entrepreneurial training and opportunities and started their own company.
• Prior trainees have gone on the postdoctoral positions (41%), hospital (8%) and biotech or pharmacological positions (51%).
• The projects completed by these students are impressive and the ongoing work is also very impressive.

Weaknesses
• As with any large program, there are a few trainees that do not finish or fall of the grid.
• There is certainly a trend to have students publish in very prestigious (and often political) journals/magazines. This trend does extend training time if students wait for papers to be published prior to graduation.
• Some trainees graduate without a first author paper but most for whom this is an issue eventually publish and often in a very high profile journal. Thus, this lag likely reflects the publication process at such journals. However, several 5th and 6th year trainees have only one (or in one case no) publication.
• The primary issue with the original submission still exists but these issues cannot be addressed in a single revision cycle. The PI has put mechanisms in place to address these issues but only time will tell if these issues will be addressed by the changes. The plan to have all students finish in 5.5 years is ambitious and the coming years will tell whether that is a realistic goal.
• The time to degree remains a major issue for Training Grant students. While the overall graduate program time to degree is perfectly fine, there seems to have been a tendency to choose poorly for those students who are supported by the Training Grant. Ideally the training grant students are the cream of the crop but that is not the case in this very elite group of trainees.
• There is a stated plan to have students complete their degree in 5.5 years but how this will be implemented (and whether it is actually even reasonable- despite the tendency to focus on these metrics) is unclear.
• There are several of the Training Grant-supported students who have taken quite some time to complete their degree and then have remained in post-doc positions at Stanford. One of these trainees who has a long time degree has still not published a first author paper and remains in the lab of the advisor as a post-doctoral fellow.

• The evaluation plan for the program is only adequate. There are no examples of survey instruments for the evaluation only a description of the process.

• Students are placed on the training grant for 3 years (1, 2, 3). This should be reduced to 2 years followed by faculty or department support.

• The PD reports on page 45 that 27 participants were in the program over the last ten years. On that same page the PD reports 10 of 14 former participants graduated with a Ph.D. degree; 14 trainees remain in the current program. However, on page 50 the PD reports that 16 students are currently in the program and 8 completed their Ph.D. degree over the last ten years. On page 45 the majority of those receiving Ph.D. degrees went on to biotech or pharmaceutical companies others went on to postdoctoral positions. On page 50 only one graduate went into a biopharmaceutical company the others to academia. These inconsistencies are troublesome.
**General Strengths:**

- Stanford has significant successful efforts in the area of diversity recruitment, yet still has plans to improve those efforts. There is an office and a recent hire devoted to diversity. The faculty also participate in visiting URM undergraduate institutes and attending the requisite meetings. Both the PI and co-PI of the Training Grant serve as leaders in this area. The number of applicants hovers between 10 and 15% but there is an upward trend in recent years. The summer SSRP training program is a good route for student recruitment and the vast majority of the faculty participates or has participated in this program. The program added mentoring for disabled students as well as first generation students.

- The PD has addressed most of the comments from the last review. The new application includes a boot camp to introduce students to the fundamentals of research, a coaching system where 2 faculty are appointed as advisors to incoming students, more frequent student committee meetings, a section for career planning, a plan to increase the number of admitted students, and a mechanism to release faculty from the program that do not graduate students in 5 years. Some of these changes are well described and if implemented should have a positive effect on the training program. The PD also states that trainees will now be funded for 2 years instead of 3.

- There were some concerns about the previous submission that have been largely addressed to the best of the ability in the time of the revision cycle.

**General Weaknesses:**

- Faculty members do not seem to participate in the Training in the Responsible Conduct of Research. In addition, some topics related to technology transfer and different ethical issues between academia and industry would be potentially well-received in this course.

- An effort is made for all students to be treated equally and thus there is an effort to see the training grant as merely the source of stipend for the students. However, the goal is for the training grant to enhance training for all students but also provide some unique training for the supported students. Addition of some trainee-specific function might highlight the value of the training grant beyond a source of dollars.

- Neither investigator nor any of the participating faculty took advantage of the publication list provided on the biosketch to indicate which of the publications listed were co-authored by trainees on this grant. Although this information is present in the tables, it is ideal if a glance at the biosketches of the trainers (or at a minimum the PIs) provides an easy window into their ongoing role in training the students specifically supported by this mechanism. One PI does not even mention his or her strong history of training in the biosketch.

- There is some concern over several trainees that have only one publication after five or six years in the program.

- Another concern is the lack of solid evaluation instruments. The application describes a plan for evaluation but it is not clear how effective the plan is for soliciting improvements.

- The PI should consider it a responsibility to read and understand any budget he or she signs his name to.

- Attention to detail in the proposal should be improved.

- The project narrative submitted has all the text converted to images. This makes it impossible to search for sections we want to revisit.