

EXTERNAL REVIEW CONSULTANT'S REPORT
University of Hawaii, Hilo
PhD in Pharmaceutical Sciences

Reviewed by:

Theresa M. Filtz, PhD, Associate Dean for Academic Programs, Oregon State
University College of Pharmacy

Peter Gannett, PhD, Associate Dean for Research, Nova Southeastern University
College of Pharmacy

Review Dates: August 3 and 4, 2021 via Zoom video conferencing

I. SUMMARY OF EXTERNAL CONSULTANT REPORT

The PhD in Pharmaceutical Sciences at the University of Hawaii, Hilo, (UH Hilo) in the Daniel K Inouye College of Pharmacy (DKICP) is a relatively new, 10-year-old program, undergoing its first external review. Funds were provided initially to build the program with support for common instrumentation and graduate program assistantships from the DKICP that appeared to be sufficient for several years. The investment paid off and the faculty have been very productive, provide an authentic research experience for the graduate students, and are very invested in the program.

Unfortunately, recent, significant downturns in PharmD program admissions have negatively impacted the tuition-driven DKICP budget. The revenue decline resulted in the loss of College-supported teaching assistantships, requiring some PhD students to self-fund or for faculty to find other sources for support. Further, admissions to the PhD program are currently suspended due to a delay in completing this review required for new PhD programs. The program has not achieved permanent status in the University of Hawaii system yet, which will require review and approval by a system-wide committee.

Faculty appear demoralized by the dramatic drop in funding, loss of two assistant professor positions, and concerns regarding support for the program at the upper levels of the University of Hawaii system, given the program's small size and current probationary status. Despite difficulties, faculty also expressed a passion for the program and appear to provide an excellent education to the small cadre of students. Graduates have obtained good positions in relevant fields.

Student satisfaction is high based on survey results and the meeting with all current students. Students were particularly complimentary of the support and advising that they have received in the past and continue to receive in the current difficult budget situation. As a group, they are positive about the training and research opportunities and appear to have developed a cohesive community. Faculty productivity is excellent for a College of Pharmacy at a primarily undergraduate institution such as UH Hilo.

Being one of only two PhD programs at UH Hilo, the program is struggling to find its place within the mission of the university. However, the program could be regarded as a gem in the crown of UH Hilo as a small but high-quality program that focuses on the needs of the Hawaiian Islands in its research programs. The emphasis on natural products research with the abundant botanical diversity of the islands and the research program on the endemic disease of rat lung worm position the program to benefit the economy and health needs of the state and island of Hawaii. It would be unfortunate if rigid adherence to metrics that require an average of three PhD graduates per year, which is not sustainable in this small program and the current environment, were to doom the program at the system level.

To sustain the program, college and university administrators and program faculty are encouraged to open dialogues to discuss mechanisms for moving forward collaboratively. Given the current state of distrust, bringing in an outside mediator may be needed initially to structure productive discussions. Perhaps the university system could identify a neutral third party at no cost to serve in this role.

As soon as sufficient trust is built to move forward, strategic planning for the program and preparation for the hearing on permanent status needs to commence as quickly as possible. Masters programs, a certificate program, or the creation of micro-credentials that utilize existing coursework and the excellent equipment facilities to train in modern techniques should be considered. The additional revenue from masters or certificate students could strengthen the PhD program. Partnering with chemistry to develop a credential in analytical chemistry of natural products or mass spectrometry analysis could be another path. Emphasizing the key issue of conservation for the preservation of flora and fauna that may yield valuable medicinal natural products may help to build support for the program across the university system and/or identify other allies in biology at UH Hilo. There may be opportunities to partner with industry on internships. We are sure that the faculty and administration in collaboration will have more ideas that may lead to program stability and future success.

We recommend that the program continue if agreement can be reached around a strategic plan to stabilize and advance the program.

II. ASSESSMENT OF QUALITY

II.A. CURRICULUM

II.A.i. The program has designated a group of faculty members with the responsibility to review and manage the curriculum:

Commendable. The program has structures for oversight of the curriculum and course

offerings are more than adequate to serve student needs despite faculty size. In fact, students would like fewer course requirements (which is common in PhD program reviews in this reviewer's experience.)

II.A.ii. The program has a formal system to evaluate teaching effectiveness: Acceptable. The program does collect information on the didactic portion of the program. This includes a 'Course Evaluation/Feedback' survey with several open-ended questions regarding a given course. There is also a mechanism for collecting instructor and course evaluations. This approach is fairly typical of PhD programs though inclusion of a peer review of the instructors might be helpful.

II.A.iii. The curriculum is well organized with clear objectives, requirements, assignments, and grading procedures: Acceptable. The program clearly outlines the course requirements, exams, and structure of the prelims for advancement to candidacy. The program is standard and acceptable for a PhD in this field. The assessment plan is also clear. Going forward, the program needs to address the suspension of the speaker series. Reportedly, external speakers were brought to the program, monthly, before the COVID-related travel restrictions but not since. The program needs to consider how to revive the seminar speakers program on a small budget. Other programs have turned to video-based speaker visits that incorporate meetings with students and faculty in a virtual, full-day visit that includes a formal seminar. Given the distance to Hawaii and budget, such a solution should be considered for at least some speakers. Engagement with other scientists and scholars from outside the university and Hawaii is important for enriching student learning and building research collaborations to sustain the program. The program may also want to consider revising its track structure. Currently, there are five tracks and this may be too many for a small program. This could be done by renaming the tracks more broadly to encompass two or more of the current tracks.

II.B. FACULTY

II.B.i. Faculty is sufficient to meet the program's needs: Acceptable. The faculty size is adequate for a program focused mainly on natural products chemistry with some additional faculty involved in assessing drug action and drug repurposing. The program also has several affiliate faculty in relevant disciplines that augment the program's core research areas, provides potential collaborators, and enriches the didactic curriculum.

II.B.ii. Program faculty's credentials and training are appropriate for the program's needs: Commendable. The faculty have the appropriate backgrounds and training for the program to deliver education and training in the program tracks it has defined. The tracks include Cancer Biology, Medicinal Chemistry, Pharmacognosy, Pharmaceutics, and Pharmacology. To support these tracks the faculty have training in relevant disciplines.

Moreover, the faculty are very productive with publications and funding in their respective research areas. This is especially true given the small amount of support for grant submissions and the lack of indirect cost return dollars to support research development. The faculty are applying for grants and have access to programs that target primarily undergraduate institutions. The faculty shared that more applications could be submitted if there were central support for grantsmanship. As long as the university retains all indirect cost returns on grants, there is no funding or incentive for units to provide this support. The UH Hilo administration needs to consider this structural issue that may impede grant success and, consequently, the degree of the program's success.

II.B.iii. Faculty reflect cutting edge knowledge in their field as evidenced by scholarly involvement: Commendable. Faculty publication rate is very good for a university such as UH Hilo. Further, faculty are publishing in respectable journals in the field such as the Journal of Natural Products. The excellent equipment facilities contribute to their ability to achieve high-quality publications and thus need sustained support.

One area of concern is that natural products research, like most other scientific fields, is requiring more expertise with computational data analysis and genomic approaches. How current the faculty's experience is in these areas or availability of collaborative support is not clear and may need to be addressed to avoid falling behind competitors in the field. This is important both for the faculty's research but also for student training.

II.B.iv. The program provides faculty with education and support through technology, library resources, and other similar services: Acceptable. The faculty had no complaints about facilities or equipment.

II.B.v. Other. Faculty explained that the current faculty union contract does not provide credit for teaching graduate students in its current definition of teaching responsibilities. Advising, teaching, and mentoring of PhD students requires a significant amount of time and effort and this needs to be quantified and included in teaching effort calculations. Other universities count thesis credits for which students register with faculty as a means to track and account for teaching graduate students. This issue needs to be explored with the university administrators and union stewards.

II.C. STUDENTS

II.C.i. Student diversity is apparent: Acceptable. The program has enrolled and graduated a high percentage of under-represented minority (URM) students, mainly Hispanic and Hawaiian/Pacific islanders, reflecting the diversity of the state of Hawaii. Graduate students described participation in outreach programs to increase interest in science in general and Pharmacy or Pharmaceutical Sciences in particular among younger students to help build a pipeline, which is commendable.

The one area of diversity that was not mentioned but was apparent at the meeting with current graduate students is the small number of women in the program. This issue needs to be described and addressed. Women are generally well represented in biomedical and pharmaceutical sciences and appear to be represented among faculty members so the low number among the current PhD cohort is a concern.

II.C.ii. Program's admission standards are stated clearly, are adhered to by the program, and are appropriate for the field of study: Acceptable. The admission requirements to the PhD program are clearly stated on the program's website (https://hilo.hawaii.edu/catalog/phd_ps). The requirements are typical of most PhD programs in Pharmaceutical Sciences (e.g., GPA 3.0 or greater, GREs required, personal statement, recommendation letters). The GPA and GRE data provided indicate the GPA rule is followed (average 3.3 over 10 years, only one GPA less than 3.0 (2.98)). Further, the admissions process was described during our visit and is aligned with what is stated on the program's website.

II.C.iii. Student retention and graduation rates are tracked and are appropriate for this discipline: Acceptable. For a program of this size, the number of students leaving the program for academic and personal reasons (approximately 25% based on data provided) is better than national retention rates for graduate programs.

The one issue of concern relates to the average program duration of 6.5 to 7 years which is significantly longer than NIH and NSF goals of 5 years or less. The program director, Dr. Ghee Tan, related anecdotally that the high percent of URM students in the program, of which they are justifiably proud, also increases the average time to graduation. In Dr. Tan's view, the particular challenges faced by URM students in academia lead to longer times to graduation. The program may wish to investigate mechanisms that help URM students progress more quickly by assessing the pressure points and working proactively to address delays.

II.C.iv. Program graduate job (or other) placements are consistent with the program's goals: Commendable. All graduates appeared to have obtained positions in a closely related field in academia or industry, including an assistant professor position in Hawaii and a postdoctoral position at an elite institution.

II.C.v. Students routinely achieve the Student Outcomes that have been established by the program: Acceptable. The Graduate Student Outcomes (GSO) are clearly stated on the program's website and in its program review report. The experiences necessary to achieve the outcomes are provided and are well-aligned with the requirements for graduation from the program. For example, GPO6 generally regards oral and written communication and students are required to prepare manuscripts and write/defend a dissertation based on their

research to graduate.

II.C.vi. Students actively participate in faculty scholarship/research: Commendable. Student productivity and participation in manuscript publication is high based on a verbal report obtained from the program director during the review of more than two publications per student. This was further supported by a review of the program faculty's biosketches as the authorship included graduate students who are often listed as the first author.

II.D. EDUCATIONAL SUPPORT SERVICES

II.D.i. There is an effective system in place by which the program tracks its students/graduates into their post-graduate careers: Acceptable. The program is tracking the placements of graduates for several years and has data on placements beyond initial and postdoctoral positions which is the most important metric.

II.D.ii. The curriculum review process for the program uses the information from this tracking system as additional information to determine whether curriculum revision is appropriate: Acceptable: The program uses the CORE CompMS platform for collecting instructor and course evaluations. The data is used for course improvement, annual faculty evaluation, and promotion and tenure. However, there is not a group that directly oversees the curriculum. The program should establish a graduate education committee that regularly reviews the curriculum, recommends additions, modifications, and deletions, monitors instructor effectiveness, etc. to ensure a high quality and current graduate curriculum

II.D.iii. Student registration, financial aid, and advisement information are all readily accessible to the students: Needs Improvement. Student financial support is a major concern for the program going forward. Before 2019, students were accepted with a promise of annual renewals of stipend and tuition waivers or support based on the provision of teaching assistantships, research assistantships, awards, or scholarships. The teaching assistantship from the DKICP has been withdrawn and so a major source of student support that included tuition waivers is now lacking. When asked, current students noted that this promise of support played a role in their decision to join the PhD program. Thus, future recruiting is likely to be impacted by the lack of funding for students. Also, the withdrawal of funding will likely lead to even longer times to graduation as students pick up work outside of thesis labs to meet living expenses and cover tuition. The faculty seem aware of this problem but need to be discussing equitable solutions. Several students have received funding from grants or other sources to cover expenses. However, while admittedly the full support profile for each current student was not available to the reviewers, it appears that the only female student currently in the program has had to find employment externally and her time to degree is likely to be greatly impacted by this.

II.D.iv. Student counseling services are available and the students are aware of how to access these services: Acceptable

II.E. PROGRAM'S MISSION AND OPERATIONS FIT WITH THE UNIVERSITY

II.E.i. The program's mission, goals, and objectives enhance the University's mission:

The program is one of only two PhD degrees awarded by UH Hilo and the only science-based PhD. This places the program in an interesting situation in regards to the mission of the University as a primarily undergraduate institution. The placement of the degree program distant from a major medical center creates challenges. However, the emphasis in the program on medicinal natural products and research with relevance to endemic diseases seems to make it an excellent fit in the University of Hawaii system. We were told that the local community and the legislature are very supportive of the program. Students want to stay in Hawaii for their education and want to be part of programs that benefit the islands.

UH Hilo needs to decide if it is committed to supporting PhD programs, the particular needs of older students (who are more likely to have families or other commitments), and the required research infrastructure in terms of equipment, grant and contract support services, and bridge funding, student stipends, and tuition waivers, among other needs. If so, then the Pharmaceutical Sciences program has productive and passionately committed faculty and students that are worth the investment. If not, then discussions should commence regarding the potential future of the PhD program in Pharmaceutical Sciences as an outpost of the UH Manoa or the medical center, or other solutions.

If a decision is made to sunset the program (which is not the recommendation of this review team), then provision for the program for at least five more years needs to be made to allow existing students to achieve graduation without penalty or imposing significant delays or consequences. Faculty will also need to be resourced to continue to meet the research requirements of position descriptions in the absence of the significant help that PhD students contribute to the completion of experiments, running and maintenance of equipment, mentoring of undergraduate students, and outreach to the community, among other benefits.

II.E.ii. The program avoids unnecessary redundancy with other University programs and activities: Acceptable. There is no other program like this in the state of Hawaii which is a strong argument for planning to enrich and sustain the degree.

II.E.iii. The program's mission and operations reflect collaborative efforts with other University Centers, Schools, and Colleges: Acceptable. The program faculty described collaborations with the chemistry department and affiliate appointments, with the biology department, with Marine Science and Agriculture at UH Hilo, and with the Cancer Center on Oahu. In turn, the chemistry department of UH Hilo and others are dependent upon the

exceptional analytical equipment housed and maintained by the DKICP. Chemistry undergraduates participate in research experiences in the Pharmaceutical Sciences faculty labs which in turn contributes to recruiting for the doctoral programs. These collaborative efforts are also key to the ongoing support of Hawaii's INBRE program and a pending COBRE proposal.

II.E.iv. The program operates cooperatively with the university's academic compliance offices, such as the Office of Institutional Effectiveness and the Academic Review Committee: This is difficult to evaluate. What was clear to the reviewers from the meeting with faculty is that dialogue, perhaps with mediation, among the Pharmaceutical Sciences faculty and the DKICP administration including the Dean and the Vice Chancellor for Academic Affairs needs to occur soon and often to increase understanding of needs, resources and limitations, and provide a base of trust for discussions to improve the current situation.

III. RECOMMENDATIONS FOR FUTURE DEVELOPMENT

The consultant concurs with the recommendations of the program outlined in the Internal Review Committee report. In addition to those recommendations made in the body of the report, the following recommendations are offered which focus on helping the PhD in Pharmaceutical Sciences advance from an acceptable to exceptional program.

- The administration needs to address structural issues surrounding the Pharmaceutical Sciences program that are inhibiting the growth of the program such as the lack of indirect cost returns to the College, poor support for grant proposal submission, and teaching credit for teaching/mentoring of graduate students. These efforts will lead to increased grant funding for research, student stipends, and tuition support.
- The graduate program needs to develop a 5-year strategic plan. A key part of this plan should be the development of additional revenue streams that can help to support the graduate program. Examples of possible options include the creation of MS programs, certificates/micro-credentials, contracts (e.g., USDA) that utilize the College's analytical instrumentation.
- The problem of the time it takes to complete the program needs to be addressed. There are many possible reasons including lack of sufficient financial support, poor preparation for graduate school, or logistics (e.g., distributed lab structure rather than co-located). Once the problem(s) are identified, suitable solutions need to be devised and implemented.

Submitted: August 19, 2021