UCC Program Review Committee summary of review

Program – Environmental and Plant Biology

This program includes the following degrees, minors, and certificates:

- B.S. Environmental and Plant Biology
- B.A. Applied Plant Biology
- B.A. Field Ecology
- Minor in Plant Biology
- M.S. Plant Biology
- Ph.D. Plant Biology
- Certificate in Bioinformatics (undergraduate and graduate)

Recommendation

This program is found to be viable, see report for commendations, concerns, and recommendations.

Date of last review – AY 2009

Date of this review – AY 2016

This review has been sent to the program director, her comment is included.
This review has been sent to college dean, his comment is included.
This review has been sent to graduate council, they have no comment to add to this report.
Executive Summary

The review team visited the Department of Environmental and Plant Biology on October 24 and 25, 2015. The department has eleven (11) group I faculty members, evenly distributed across rank, and one (1) group II lecturer. The department offers the following programs:

- Environmental and Plant Biology (B.S.), Applied Plant Biology (B.A.), and Field Ecology (B.A.) plus a minor in Plant Biology
- Plant Biology (M.S. and Ph.D.) plus participation in Environmental Studies (M.S.) and Molecular and Cellular Biology (M.S., Ph.D.)
- Certificate in Bioinformatics (Undergraduate and Graduate)

Teaching and mentorship of undergraduate students is broadly oriented in botany, deliberately planned by the department to meet student needs, and effective. Graduate student mentorship is similarly effective. Faculty research areas are focused on 1) Molecular and Cell Biology, 2) Plant & Forest Ecology and 3) Systematics & Evolution, and are highly productive.

Commendations

- The external review team member, a plant and environmental biologist who has reviewed several similar programs nationally and internationally, notes that the Ohio University Environmental and Plant Biology Department may be unique for its broad-spectrum approach to teaching and training at both the undergraduate and graduate levels. This broad approach includes providing concepts and skills in all major areas of plant and environmental biology (including molecular, organismal, and ecosystem levels), as well as courses that provide students with a skills toolbox designed for post-graduation success: biostatistics, scientific writing, bioinformatics, research ethics, and international field experiences. Many undergraduates take advantage of this surprising degree of curricular breadth to learn about and become directly engaged in diverse faculty-led research projects. Undergraduates also benefit from an unparalleled internship program, likewise supported by admirable program breadth, that students have leveraged into permanent jobs in their desired fields. This superb internship program is a model that could be followed by biology departments elsewhere.

- The department designed its broad curriculum during the university’s period of transition to the semester system, primarily to serve student needs (not just faculty teaching preferences, as is so often the case). Program breadth allows students to tailor curricula to support
diverse career goals that include non-profit conservation work, graduate training in plant and environmental biology, and related private sector opportunities. To ensure continuation of its commitment to excellence in program curricular breadth, the department has included contributions to broad-spectrum teaching and training a high priority (in addition to high potential for research success and collegiality) when making new hires.

- There is a very high level of student-centered and engaged learning for both undergraduate and graduate students; these opportunities include student involvement in research labs, extensive internship opportunities for both research-driven and application-driven students, study abroad opportunities focused on PBIO, and other active learning opportunities, both curricular and co-curricular.

- The number of TA allocations, assumed due to the service load of the department, allows stable support of graduate students through their studies.

- Decision making, in general, was found to be deliberate and shared across the department. One specific example is the decision to focus the major programs from five to three bachelor’s degrees during the quarter to semester transition; instead of merely converting the number of hours in the major, the Department chose to reorganize their undergraduate program to maximize student and faculty success.

- The entire faculty not only maintains a high standard of research and professional development, but they also must be congratulated on their high quality of teaching and service to their department and Ohio University. Noted is their sincere dedication to degree core courses as well as those within the area of special topics. This is assessed by the successful graduation rate, external work of the students – both undergraduate and graduate, and the interview responses from both levels of students. The atmosphere of the department is both one of nurturing and academic challenge. The faculty go beyond research and instruction to guide all the students in their career paths.

Areas of concern

- In the department self-study, extensive repair or replacement of the 45-year old department greenhouse was cited as a high priority because the diverse plants maintained there are key instructional resources that cannot be sourced in any other way. Plants produced there are essential to all levels of the curriculum, from introductory majors and non-majors courses to advanced instruction, impacting hundreds of students annually. The department greenhouse also supports important community outreach activities. The review team toured the greenhouse, noting numerous deficiencies in the physical plant that not only endanger reliable supply of instructional materials, but may also present potential health and safety (therefore liability) issues. These deficiencies include inadequate temperature control, jury-rigged electrical and watering systems, uneven and potentially slippery floors, asbestos partitions, and issues with glass. The external reviewer judged the department greenhouse to be the single worst greenhouse facility observed in a decades-long career involving national and international plant biology department visits and reviews. Although immediate plans to replace missing glass will help in the short run, the review team agrees with department assessment that complete greenhouse replacement, at the current or other site, is highly desirable as soon as possible.
• Another high department priority is replacement of 3 outdated autoclaves (sterilizers) that are routinely used to prepare materials for instructional purposes as well as undergraduate and graduate research activities. Autoclaves are essential to daily operation of any plant science department. No modern autoclaves are available in the Environmental and Plant Biology department. In the opinion of the external reviewer, whose routine instructional activities involve autoclave use, and who is familiar with autoclaves typical of other plant biology departments, the outdated autoclaves present imminent danger of failure that would disrupt instructional activities. Old, wet metal tends to develop rust and holes that compromise equipment performance. Because autoclaves involve high-pressure steam lines and hot surfaces, they are also a health and safety concern for staff and student operators. Modern autoclaves incorporate safety features that reduce danger to users. In view of the everyday instructional importance of department autoclaves, and safety concerns, the review committee recommends that the department replace autoclaves as soon as possible. In the meantime, the department and college should ensure that autoclaves receive safety inspections and that all users receive autoclave safety instruction.

• A third high priority department concern is serious erosion of the operating budget that has occurred over time due to budget cuts and inflation. These financial resources are essential to maintaining adequate instructional services, yet the department has no current way to supplement them. The review committee strongly recommends that the department faculty and staff work with college and university development experts to increase the potential for gift sources of revenue.

• Deferred maintenance was a top concern of faculty in the department.

• Current development (fundraising activity) appears to be largely opportunistic and based on the availability of one-time only monies. This limits the ability to fund longer-term projects (e.g., building a new greenhouse) or anticipated needs beyond the current fiscal year (e.g., saving money over multiple years to purchase new autoclaves or other high-cost essential durable equipment).

Recommendations

• A focus on PBIO-specific advancement and development efforts is needed. A more sustained and strategic development plan, coordinated with both the College and University development offices, that identifies successful graduates (who could be tapped as donors) and products/services within PBIO that could commercialized may serve as opportunities to create PBIO-specific funding opportunities. These efforts should not be made the responsibility of the Department, but a place where the support units of the University help serve the development and advancement needs of the Department.

The review team found the program to be viable.
Introduction

Overall Program

The department has eleven (11) group I faculty members, evenly distributed across rank, and one (1) group II lecturer. The department offers the following programs:

- Environmental and Plant Biology (B.S.), Applied Plant Biology (B.A.), and Field Ecology (B.A.) plus a minor in Plant Biology
- Plant Biology (M.S. and Ph.D.) plus participation in Environmental Studies (M.S.) and Molecular and Cellular Biology (M.S., Ph.D.)
- Certificate in Bioinformatics (Undergraduate and Graduate)

Teaching and mentorship of undergraduate students is broadly oriented in botany, deliberately planned by the department to meet student needs, and effective. Graduate student mentorship is similarly effective. Faculty research areas are focused on 1) Molecular and Cell Biology, 2) Plant & Forest Ecology and 3) Systematics & Evolution, and are highly productive.

a. Is the current number and distribution of faculty sufficient to carry out the broad overall mission of the Department (Teaching; Research, Scholarship and Creative Activity; Service)?

During the period under review, with the exception of AY2011-2012, the Department has had twelve faculty members. In each year, there have been twice as many tenured faculty members as non-tenured faculty members. Since AY 2013-14, there has been one Group II faculty member; the remainder are Group I faculty. Given the Department’s goals of balancing teaching, research, and service, the emphasis on Group I faculty appears appropriate.

In conversations, the faculty described their teaching/research/service (TRS) distributions as 40/40/40 (the self-study formally states 40/40/20). Although the equal emphasis on all parts of the TRS distribution might imply a need for more Group II faculty who can assist with the service load as well as the teaching load, the complementary nature of the Department’s teaching, research, and service outputs (as described in the self-study) indicate that Group I faculty should be retained and recruited, should there be retirements or other departures, to sustain the current overall mission of the Department. The current search for a Group I quantitative plant biologist will also support the overall mission.

The number and distribution of faculty members across the major areas of undergraduate interest in plant biology appears to be sufficient. As the external reviewer noted, the Department is unique in its ability to deliver a comprehensive plant biology program in its teaching at both the graduate and undergraduate levels: the comprehension includes the cellular/molecular, organismal, and ecological levels; multiple analytical models; and, coursework in writing, ethics, and informatics.

When additional teaching needs arise, the Department has appropriately used Group III and IV faculty members, as well as early-retired faculty members to supplement the Group I and II
teaching power. Graduate Teaching Associates are also allowed to teach independent sections on occasion. The Department should monitor whether the specific teaching needs met by non-Group I/II faculty are regular and recurrent. Should the specific teaching needs become regular, the Department and Dean should consider whether part-time or full-time Group II faculty may be more appropriate than repeated uses of Group III and IV faculty.

In reference to research, the eleven Group I faculty members are approximately equally distributed across the cellular/molecular, organismal, and ecological areas. The Department’s decision to standardize (roughly) the teaching commitment at 2/1 has allowed space for research. Ten of the faculty members are very research active, and are accomplished at both publication and securing external funding from highly competitive sources. The research mission is being met, if not exceeded.

b. Is the level of the Department’s RSCA appropriate for the program given the size of the faculty and the resources available to the Department? Is the Department’s level of external funding at an appropriate level?

In the opinion of the external reviewer, a plant and environmental biologist, the department’s level of external funding is admirable and consistent with high teaching expectations and high service loads. (All department faculty members perform major department administrative functions that in parallel departments at other institutions are often performed by professional staff. e.g. professional undergraduate advisors and instructional laboratory coordinators.)

Over the 7-year study period from 2009-15, department faculty acquired $4,431,177 in external funding (a mean of $633,025 annually). Evidence for high motivation to garner external funding is the written expectation that candidates for promotion to Associate Professor with tenure are expected to have acquired a minimum of one major external grant in excess of $100,000 as principal investigator (Department of Environmental and Plant Biology Policies on Contract Renewal, Promotion and Tenure 2013, page 7.)

c. Is the level of service, outside of teaching, appropriate for the program given its size and the role that it plays in the University and broader communities it interacts with? Is the Department able to fulfill its service mission?

The faculty as a whole exceed the service as expected in their department, and appeared quite happy in all of their work. The phrase “labor of love…” was a recurring statement throughout the committee’s two-day visit – not only relative to the faculty, but also the support administrative and technical staff. Examples include: 1. The garden area on West State that is maintained, sometimes 30+ hours per week by a faculty member outside his duties and student interns is a highly positive facility for student and faculty collaboration that impacts the Athens community. The number of hours required beyond a normal work hours of the one technician who maintains the antiquated greenhouse on an insufficient budget. In summary, the Department fulfills its service mission to the university and community despite the low number of faculty, technicians, and minimal budget.
d. Does the Department have an appropriate level of financial resources, staff, physical facilities, library resources, and technology to fulfill its mission?

The department is seriously concerned about the erosion of their operating (non-payroll) budget over time, a decrease from $87,548 in 2008-09 to $70,617 in 2014-15. Further, the review team repeatedly heard that several resources (such as House Bill funds) are no longer available, so the non-payroll budget is used for more areas than it was historically.

The current technical support staff includes a few exceptional individuals whose experience allows the Department to run smoothly. Current staffing is not adequate for long-term plans. One example: when the greenhouse technician is covering the work of several individuals, not only completing what is needed for the Department and expected of him, but also performs tasks that are critical to keeping the physical structure operational when the campus maintenance personal refuse to do so due to safety issues. This person has grown into a position that keeps placing new demands on him that in the future will require the talents and skills of several individuals. Currently, there is no one on staff who can take over if he has to take temporary leave. His absence would directly affect not only the Department, but also the University and Athens community. Additionally, Associate Professor Art Trese contributes a great deal of time at the West State Street gardens, effectively functioning as a part-time technical staff member in his spare time; he estimated as 30 hours per week. While he appeared to be content doing this, staffing plans are dependent on this “donation” which may not be sustainable in the long term. (When asked what would happen, if he retired or got ill, he thought and said the class would probably just become an academic class.) In summary: there are several persons who could not be replaced if they experienced personal emergencies.

In the department self-study, extensive repair or replacement of the department greenhouse was ranked as a high priority because the diverse plants maintained there are key instructional resources that cannot be sourced in any other way, and are also important to department community outreach activities. The review team toured the greenhouse, noting numerous physical plant deficiencies that not only endanger reliable supplies of instructional materials but may also present potential health and safety (therefore liability) issues. These deficiencies include inadequate temperature control, jury-rigged electrical and watering systems, uneven and potentially slippery floors, asbestos partitions, and missing glass. The external reviewer judged the department greenhouse to be the single worst greenhouse facility observed in a career of national and international plant biology department visits and reviews. Opportunities lost due to the current state of the greenhouse exist. One faculty member reflected that it limits publication quality research due to the lack of control. The review team agrees that complete replacement, at the current or other site, is highly desirable as soon as possible. During conversation, it was estimated that, with the current level of staffing and funding for the greenhouse, it has a maximum usable life expectancy of 5 to 10 years.

Another department facility priority is replacement of outdated autoclaves (sterilizers) that are routinely used to prepare materials for instructional purposes as well as undergraduate and
graduate research activities. No modern autoclaves are available in the department. In the opinion of the external reviewer, whose routine instructional activities involve autoclave use, and who is familiar with autoclaves typical of other plant biology departments, the outdated autoclaves present imminent danger of failure that would disrupt instructional activities. Because autoclaves involve high-pressure steam lines and hot surfaces, are also a health and safety concern for staff and student operators. The review committee recommends that the department purchase new autoclaves as soon as possible.

A fourth high priority department facilities concern is deferred maintenance, a campus-wide issue.

**Undergraduate Programs**

The undergraduate programs in Plant Biology serve both major and non-major populations. For non-majors, the Department offers six general education courses that fulfill either the Tier II Natural Science or the Applied Science and Mathematics requirement. Plant Biology offers three major pathways: the B.S. in Environmental and Plant Biology, the B.A. in Applied Plant Biology, and the B.A. in Field Ecology. In the years under review, there have been 58 to 77 Plant Biology majors. Students in these undergraduate majors are of high quality on both measures of high school GPA and ACT/SAT scores. Undergraduate students complete the program in a timely manner; the Department has significantly better 4-, 5-, and 6-year graduation rates than the University. Honors Tutorial College students may also complete a B.S. in Environmental and Plant Biology. The Department also offers a minor in Plant Biology and an undergraduate certificate in bioinformatics in conjunction with Biological Sciences, Mathematics, and Computer Science.

a. *Is the program fulfilling its service role, adequately preparing non-majors for future coursework and/or satisfying the needs for general education?*

The Department fulfills its service role to the University and satisfies the needs for general education. The Department offers five courses that fulfill the Tier II Natural Sciences requirement and one course that fulfills the Applied Science and Mathematics requirement. These courses serve approximately 2000 non-major students each year; there was a 500 person spike in AY 2011-12, but repetition of this spike seems unlikely. For these non-majors, the Department reports that their service/general education goal “is to produce educated citizens who have sufficient knowledge of plant structure, function, and ecology that they can understand contemporary issues related to plants.”

The learning objectives in OCEAN and on sample syllabi appear to meet these goals. Specific course topics (e.g., global climate change, green roofs, applied gardening) address contemporary issues related to plants. In the years under review, there has not been a formal assessment of these non-major courses to determine whether the learning objectives for non-major courses are being met in terms of sufficient knowledge of plant structure, function, and ecology. Student engagement and satisfaction are assessed with instructor evaluations.
Students are highly satisfied; nearly all sections receive ratings above 3.5 on a 5-point scale and most are above 4.0. Faculty report a number of engaged and active learning strategies. These strategies seem likely to promote engagement, but, without formal assessment, it is difficult to tell if the objectives are being met. The self-study states on page 62 that an assessment plan will be developed for the certificate program to determine whether the overall learning objectives of the certificate will be met. Coordinating the development of this assessment plan with an assessment plan for the non-major courses would supply additional information on whether non-major courses learning objectives are being met. This is well within the Department’s capabilities, as evidenced by the assessment plan that has been designed for implementation in AY2014-15 for the major and graduate programs.

b. Is the program attracting majors likely to succeed in the program? Is the number of majors appropriate for the program? Is the program attracting a diverse group of students?

The Department’s undergraduate numbers from the fall 2014 self-study list lists a total of 58 undergraduate students and the incoming Freshman academic profiles from 2008-2014 are as follows:

<table>
<thead>
<tr>
<th>ACTE</th>
<th>ACTM</th>
<th>ACTC</th>
<th>SATV</th>
<th>SATM</th>
<th>HS RANK</th>
<th>HS GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.44</td>
<td>23.57</td>
<td>24.48</td>
<td>585.85</td>
<td>576.85</td>
<td>67.67</td>
<td>3.41</td>
</tr>
</tbody>
</table>

Considering that the number of majors continues to rank third among a number of prestigious universities, the amount and types of awards and honors received, and the after-graduation placements in the related fields and graduate programs, their majors are highly successful.

Noting the small size of the faculty (12) who teach classes within the Department for majors and non-majors, the number of majors appears to be more than adequate.

Relative to diversity, the most current statistics are from Fall 2014.
- Male: 70% - Female: 30%
- Minority (male & female): 17%
- White: 83%

The 7-year data set reveals a fluctuation of women from 29% to 47%. According to the self-study, these numbers are similar to undergraduate schools nationally.

The department has successfully proposed a new course, Women in Science, which has not yet been taught due to staffing issues. The course will be taught next semester.

c. Does the undergraduate curriculum provide majors with an adequate background to pursue discipline-related careers or graduate work following graduation? Are students able to move into discipline-related careers and/or pursue further academic work?
The undergraduate curriculum provides majors with adequate training and knowledge to pursue discipline-related careers or graduate work. The previous 2008 self-study identified a tension between the needs of students interested in graduate work and students interested in applied and career work. With the opportunities provided by the quarters-to-semesters transition, the Department redesigned their majors to offer B.S. degrees to students interested in pursuing further academic study and B.A. degrees to students interested in plant biology-related careers. We commend this choice. In this redesign, all majors are required to take a set of core knowledge courses and a set of professional skills courses. Within each major (environmental and plant biology, applied plant biology, and field ecology), students take courses appropriate to their area of study.

The coursework appears to provide a strong common knowledge and professional skills base. The decision to require courses in professional writing, ethics, and statistical methods should be applauded; the Department’s recognition that science takes place in a social and professional context is an approach that should be modeled by many other scientific and technical disciplines.

The curriculum requires that undergraduate majors either participate in independent research under the supervision of a faculty member or complete an approved internship. In our conversations with faculty and with undergraduate students, it was reported that many students do both. Undergraduate involvement in research provides both a background for the student’s future success and an opportunity to advance the other missions of the Department. The undergraduate research has been successful, resulting in presentations, publications, and, in some cases, funding. Participation in internships similarly provides a background for future success and advances the Department’s missions. It should be noted that the number of internships opportunities cultivated by the Department now exceeds the number of available students, and that there is substantial conversion of these internships to offers of full-time future employment or admission to graduate research programs.

In addition to undergraduate research opportunities and internship opportunities, students reported to us that there are several engaged and active learning strategies that are offered to students as part of the curriculum and in co-curricular opportunities. These include: plant biology-specific study abroad/global opportunities, directly supervised lab work, field trips, physical plant specimens that can be examined in labs, the herbarium, and the greenhouse, plant propagation and cultivation opportunities in the greenhouse, the West State research site, and for home/independent use, strong role modeling by faculty, travel stipends for conference presentation, and others. The breadth and excellence of these opportunities should be applauded.

The Department has also created a strong mapping of their major learning objectives, the courses in which these learning objectives can be assessed, and the means by which they intend to assess student learning. A specific implementation plan for this assessment has been created. The Department also uses exit interviews and a brief questionnaire to assess the program’s ability to prepare students for future careers and/or academic work. These interviews
confirm that the active learning strategies lead students to feel prepared for careers or graduate school. The responses to the questionnaire indicate that students feel that the program learning objectives have been met.

d. Are the resources and the number of and distribution of faculty sufficient to support the undergraduate program?

By comparison to parallel plant and environmental science departments elsewhere, the equivalent Ohio University department faculty appear to teach more courses per semester, and a greater range of courses. In view of the university’s strong mission in undergraduate education, which includes undergraduate research training, and also high expectation for faculty led graduate research training, current faculty are dedicated to providing a high quality, broad-spectrum instructional program, even though they recognize that they teach more than colleagues at many other universities. Department faculty look forward to filling an existing approved line for a quantitative ecologist, who will add critical instructional expertise.

e. Are pedagogical practices appropriate? Is teaching adequately assessed?

Pedagogical practices included a great deal of experiential learning opportunities outside the classroom requiring impressive effort and dedication by the faculty. Further, faculty members discussed with our review team the various levels and types of pedagogical techniques that are practiced within the classroom (i.e. team learning, active learning, clickers.) Overall, faculty members are both knowledgeable and actively choose what practices they feel are effective. Meetings with students confirmed positive engagement with classroom practices.

Appendix 8 of the self-study communicates the formal program objectives for the undergraduate degrees, and courses to which the objectives map. Students will use e-portfolios, reviewed semiannually by their advisor to assess their progress. Exit interviews of graduating majors are also used heavily, as well as student self-assessment of outcomes. In classes, grades are the primary form of assessment of student achievement. Current assessment reflected in the self-study also includes student course evaluations and peer assessment of instruction for probationary faculty.

The review team was unable to discuss pedagogy and assessment with regional campus faculty or students. The self-study and discussion with department leadership reflected that student course evaluations have been used. However even this basic mechanism is often greatly delayed, or are not delivered to the department at all. Recently, there seems to be some improvement in getting a better response from regional campus programs.

Graduate Program

The department has a strong graduate program that awards Ph.D. and master's degrees. The department reports a high level of satisfaction with admitted graduate students, particularly Ph.D. candidates. Graduate students, who are largely supported by teaching assistantships,
report that they are compensated at a reasonable level and have support guarantees consistent with time periods needed to complete graduations. Graduate students also report a high level of satisfaction with the quality of advisor supervision, in terms of both faculty expertise and time commitments. Even so, the department would benefit from new resources that would allow them to reimburse travel costs for applicants invited for interviews and to compete effectively for applicants in molecular and cell biology, and graduate students would benefit from increased resources for travel to conferences to report their discoveries.

a. Is the program attracting students likely to succeed in the program? Is the number of students appropriate for the program? Is the program attracting a diverse group of students?

Program requirements are a background in the natural sciences with a “significant biology emphasis” and a minimum 3.0 GPA. GRE scores are preferred to be over the 50th percentile. As evidenced by graduation rates, publication records, and placements, students are succeeding. In meetings, faculty stated they were generally pleased with the quality of graduate students, and graduate students felt they had the support to be successful. Graduate enrollment appeared stable with an average of 30 students enrolled per year. There seemed to be a recent trend towards more PhD students. There was some reflection that more TAs to support teaching was desirable, but this did not seem to be a major concern.

From the self-study: 63% of the graduate students (42% doctoral and 88% masters’ degree students) were U.S. citizens. The largest number of non-U.S. citizens came from China and India with five other nations represented during this time-period. The average number of male graduate students was 52%. The graduate population is diverse.

b. Does the graduate curriculum provide an adequate background to pursue discipline-related careers following graduation?

The departmental self-study documents a high degree of success in employment placement for department graduates, who may work in academia, public service, non-profit organizations, or private sector positions, generally in fields directly related to their educational training. The Environmental and Plant Sciences department has carefully examined student employment options and designed distinctive curricular tracks that provide tailored educational experiences. In providing for the needs of students planning to work outside academia, the department is ahead of many similar departments elsewhere. Graduate students preparing for employment within and outside of academic reported a high degree of satisfaction with curricular offerings and tracks.

c. Does the program provide adequate mentoring and advising to students to prepare them for discipline-related careers?

In the meeting with the review committee, graduate students were very pleased with the quality of advising, reflecting they had adequate access to mentorship. Publication rates of graduate
students is impressive and a measure of both internal effectiveness, as well as building a record for future success. Several students (including PhD candidates) stated they were preparing for non-academic careers, and felt they were being adequately prepared.

d. Are the resources and the number of and distribution of faculty sufficient to support the graduate program?

By comparison to parallel plant and environmental science departments elsewhere, the equivalent Ohio University department faculty appear to teach more courses per semester, and a greater range of courses to meet the needs of university graduate students. Consequently there are few courses designed exclusively for graduate students; advanced courses typically enroll both advanced undergraduates as well as graduate students, though the latter are expected to satisfy higher requirements. Although workable, there was some concern that students that attended OU as undergraduates and had already taken the course had limited course opportunities.

In terms of potential research fields, this relatively small department has wisely focused on a limited number of research and graduate education and training areas for which adequate faculty expertise is available. Department faculty look forward to filling an existing approved line for a quantitative ecologist, who will add critical instructional expertise.

e. Does the program offer appropriate financial support to graduate students?

As reported by the self-study and an interview with the current graduate students, all students are receiving financial support. The students stated that their financial support was sufficient from acceptance through graduation. Students did report the cost of health insurance and general fee were a burden. Small measures such as deducting the general fee from each paycheck rather than up front at the beginning of the term would be appreciated.

f. Are students able to move into discipline-related careers?

The program has a successful record. Appendix 6 of the self-study reports of the 19 Ph.D. and 31 M.S. graduates since the last review, 90% all graduates were placed into appropriate positions in academic, governmental, and corporate areas. The remaining 10% are mostly unknown.

g. For doctoral programs, questions related to D.III of http://regents.ohio.gov/rgp/pdfs/RACGS%20Guidelines%20Approved%20102403.pdf

(Link is out of date. Update to page 24-26 of current guidelines? See below.)

These questions are answered on the following pages.
Quality Standards

Members of RACGS have developed the quality standards listed below. Assessment of continued compliance with these standards must be included in the graduate program review process.

1. Program Faculty

A level of faculty productivity and commitment shall be required commensurate with expectations of graduate program faculty as indicated by the following:

- The number and qualifications of graduate faculty members are judged to be adequate for offering the graduate degrees in the specified areas, and faculty supervise an appropriate number of students.
- The preparation and experience of the faculty are appropriate for offering the graduate degree in an intellectually challenging academic environment as demonstrated by active scholarship and creative activity judged by accepted national standards for the discipline.
  - Faculty members have achieved professional recognition (nationally, internationally).
  - The faculty garners significant external funding, as defined by disciplinary norms, which enhance the graduate program.
  - Directors of dissertations and a majority of committee members generate new knowledge and scholarly and creative activity as determined by disciplinary norms.

The Environmental and Plant Biology graduate program focuses on a limited number of areas for which highly qualified faculty are available. Qualifications of faculty for supervision of graduate research are maintained by a demanding set of criteria for promotion (Department of Environmental and Plant Biology Policies on Contract Renewal, Promotion, and Tenure, 2013). Most faculty members each supervise 2-4 graduate students at any one time.

In the opinion of the external reviewer, a plant and environmental biologist, the faculty curriculum vitae provided in the self-study demonstrated strong publication records, evidence for levels of expertise more than adequate for providing graduate degrees in Environmental and Plant Science. The curriculum vitae indicate that several department members currently or in the recent past have played important leadership roles in national and international research societies, thereby providing academic service as well as receiving peer recognition. Over the 7-year study period from 2009-15, department faculty acquired $4,431,177 in external funding (a mean of $633,025 annually). This level of external funding is consistent with high teaching expectations and high service loads, and motivation for seeking external funding is driven by high promotion standards (Department of Environmental and Plant Biology Policies on Contract Renewal, Promotion, and Tenure, 2013).
2. Program Graduates Since the Most Recent Review

A level of student satisfaction, student accomplishment, and graduate accomplishment exists as evidenced by the following:

- Students express satisfaction with advisement, teaching, and program support services.
- The structure and conduct of the program lead to an appropriate degree completion rate and time-to-degree.
- The predominant employment of graduates within three to five years after graduation is in fields consistent with the mission of the program.
- Graduates demonstrate preparation for career-long learning and success as indicated by periodic surveys of career changes, job satisfaction, and relevance of doctoral training to various career opportunities.
- Accomplishment and potential of program graduates to generate new knowledge or new initiatives in teaching, public service, and/or other practice.

Addressed earlier in the report.

3. Program Vitality

A vital graduate program is dynamic and should possess the following indicators:

- The environment of the doctoral program promotes a high level of intellectual interaction among students, graduate faculty, and the larger academic community;
- The curriculum has been updated during the period under review with disciplinary developments;
- Essential resources are provided (e.g., library materials, computer support, laboratory facilities and equipment, student financial support, etc.); and
- Requirements for completion of the degree are deemed appropriate to the degree.

The graduate program in plant biology is dynamic and vital. The general program review report already outlines this vitality.

There is a high level of intellectual interaction among students and the graduate faculty, as demonstrated by extensive interaction in teaching opportunities where graduate students serve under the mentorship of faculty, in research opportunities where graduate students and mentored in labs and in grant writing, and in service opportunities where graduate students are encouraged to become engaged and active members of their professional communities. There is also a high level of intellectual interaction as evidenced by extensive publication, conference presentation, and other intersections of students and faculty with the larger academic community. Graduate students and faculty interact with professional and academic staff at research sites within Ohio, within the US, and across the globe.
The Master’s and Doctoral programs were examined during the quarters-to-semesters transition and appropriate updates were made the curriculum. The assessment plan to be implemented in AY 2014-15 for the graduate programs will allow curriculum revision, if needed, to meet disciplinary norms and developments. The current requirements to complete the MS, the PhD, and the Certificate are appropriate.

Essential resources are provided and are currently adequate. A full examination is offered in the main report. To sustain essential resources, renovation or replacement of the greenhouse is strongly encouraged, as is a plan to sustain essential equipment such as the autoclaves.

4. Program Demand

A graduate program should be able to demonstrate that there is demand on the part of prospective students and that it is fulfilling a clear need through the following:

- Student demand/enrollment during the period under review: application ratio, student GPA and GRE scores, or other indicators as appropriate; and
- The extent to which the program meets community, region and state needs and occupational societal demands.

Addressed earlier in the report.

5. Program Interactions

Graduate programs do not exist in isolation but rather in relation to and in comparison to similar programs in the discipline at other institutions and to cognate areas in the same institution. Information regarding appropriate interactions should include:

- Centrality of the program to advanced study in the specific discipline(s) regionally or nationally;
- The ability of the faculty and students to make a particular contribution in this field;
- Interactions, including interdisciplinary, among graduate, undergraduate, and professional programs, as appropriate;
- Interactions with and in collaboration with similar programs at other universities and organizations; and
- Programmatic access to special leveraging assets such as unique on-campus or off-campus facilities, non-university experts or collaborative institutions in the discipline, industrial or other support, endowments, as well as special funding opportunities.

By maintaining a broad curriculum that includes training in state-of-the-art tools, and at the same time focusing on a limited number of research areas commensurate with availability of faculty expertise, the department produces graduate students that successfully compete for academic and other positions in their field. The department self study provides abundant
Evidence for successful placement of master's and Ph.D. students in the environmental and plant biology field.

Faculty and graduates of the program are particularly well qualified, by virtue of a determinedly broad curriculum that is organism-centered and that includes training in state-of-the-art research tools, to engage in interdisciplinary work of diverse types. Few (and possibly no other) environmental and plant biology graduate programs provide graduate students with as wide a range of curricular offerings ranging from molecular biology to ecosystem studies, coupled with the most advanced research tools. The department is a recognized leader in the development of bioinformatics curricula.

The departmental self-study documents numerous cases of effective interactions with other Ohio University departments, including interactions with computer science faculty in the development of bioinformatics courses and curricula, engagement with geological sciences faculty in the development of field courses, and research associations with engineering faculty that have led to patents. More than 40% of department MS and PhD graduates were in the Molecular and Cellular Biology interdisciplinary graduate program.

The department self-study documents diverse faculty research collaborations with other universities and organizations.

The department supervises valued field research and teaching facilities at the university's 170-acre Ridges Land Lab (also used by the Departments of Biological Sciences and Geography). New facilities there include a high tunnel growth structure that allows work to occur on an extended seasonal schedule. The department also manages the Dysart Woods Land Laboratory located about 100 miles from campus; this environment consists of 450 acres of old growth forest and other ecosystem that offer unique opportunities for forest ecology research. Department faculty have garnered infrastructure grants from NSF that bring some key department facilities to state-of-the-art levels: 1) an upgrade of the Bartley Herbarium, a critical resource for biodiversity courses and research, and 2) walk-in controlled environment chamber enabling a diversity of research studies.

6. Program Access

There should be evidence that the program has established or seeks to establish an appropriate level of diversity among its faculty and its graduate student body, as evidenced by:

- Trends and expectations in student demographics; and
- Proven efforts to sustain and enhance diversity of faculty and students.

The self-study reports continued efforts towards diversity. Women currently are one-third of all faculty members, which doubles their representation in the 2008 review. The self-study describes efforts to include women in the faculty recruitment process. In one interview, the lack of spousal employment opportunities was presented as a source of stress. In the opinion of
some internal reviewers, greater effort by the university may lead to better retention of female faculty. Diversity of under-represented ethnicities amongst faculty members remains a challenge largely attributed to the “pipeline” problem limiting potential applicants.

Women represent approximately half of all graduate students. Nationalities of graduate students are predominantly U.S. (63% overall), with the dominant non-U.S. nationals being from India and China.

7. Assessment Mechanisms Used in Program Review

Since quality indicators are increasingly becoming an integral part of ongoing program review, an enhanced recognition of the uses of outcomes assessment in the review process provides a useful tool for program improvement, as demonstrated by:

- A summary of the appropriate outcome measures used to assess program quality; and
- Procedures must be in place to ensure the use of assessment data for continuous quality improvement of the program.

Assessment of graduate students, and the graduate program in general, seems to follow traditional internal (course grades, comprehensive exams, dissertation proposals, and defenses) and external (publications, conference presentations, placement of graduates) measures.

The department has developed Learning Outcomes, which appear clear and testable for the PhD and MS in Plant Biology in 2014-15. The plan for the current (2015-16) school year is to further refine the outcomes, link courses to the outcomes, and develop tools to assess these outcomes. The following year calls for the implementation of assessment by individual faculty members in their courses, as well as for programs.
Hello David,
I have read over the report and do not find anything in it to which I feel I need to respond.
Cheers,
Morgan

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On Dec 13, 2015, at 9:15 PM, Ingram, David <ingram@ohio.edu> wrote:

Dear Morgan and Bob

Please find attached the review of the programs of the Department of Environmental and Plant Biology

UCC policy is that Dean and Chair have 14 days to let me know of any issues they have with the report. With due regard to the holidays, if I receive nothing by 5:00 PM on Monday January 11 I will assume you have no objection to me proceeding to Graduate Council for their observations on the graduate programs and then to UCC for approval of the review. Once approved by UCC, the review is forwarded to the Provost so that it can be included as an information item for the Board of Trustees. I am told, by Howard Dewald, that the Provost is expecting deans to comment on the review of their programs, and that if the approved review reaches her without those comments she will seek them.

Let me know if you have any questions.

Thanks
David
David C. Ingram  
Chair, UCC Program Review Committee  
Ohio University  

<EnvandPlantBiolProgramReview Final Team Draft.docx>
David Ingram  
Chair, UCC Program Review Committee  

Dear David:  

I am writing in response to receipt of the program review report for Environmental and Plant Biology. To a considerable extent, the report accurately reflects the current state of the department’s programs. This is a very high functioning department that has a good balance of activity between its undergraduate and graduate programs, as well as its teaching and research mission. I often hold it up as an example to which other departments should aspire. There are challenges related to departmental facilities, staffing and budget, but the department is working diligently with the college to develop plans to address the issues, and I believe we are making progress in each of these domains. In particular, plans are in place to assess the cost of renovating the greenhouse, provide additional staffing support and increment the operating budget. Please let me know if you have additional questions or concerns.  

Sincerely yours,  

Robert A. Frank, Ph.D.  
Dean, College of Arts and Sciences  
Professor of Psychology