I. Statistics Graduate Program Review Report

Hal Koenig presented an overview of the program review report for the graduate program in Statistics. He shared his concern about the department’s faculty work load in advising, teaching, and consulting relative to its budget, and described the department as a proverbial “cash cow.” He reported that all but one faculty member had a salary that did not match the 25th percentile of academic statisticians with the same rank and similar years in rank. Koenig described the faculty as collegial and hard-working. He reported a sense of capable leadership and the potential to do much more than the department is doing now, if properly supported by the University.

Robert Smythe, chair of the Statistics Department, thanked the committee for a thoughtful and thorough report. He indicated he was in accord on the large issues identified in the report, but had some reservations with some of the minor points in the document. Regarding the recommendation to add a faculty member with strength in computational statistics, Smythe reported that all of the last four hires have had strong computational skills. He disagreed with the recommendation that new faculty be able to direct doctoral students within two to four years. The phenomenon of post-docs in the field of statistics is non-existent, and he does not want someone right out of their own PhD program to take on doctoral students. Smythe indicated that they will have to think carefully about structuring funding before implementing the recommendation to grow the Survey Research Center. He believes the university should take responsibility for some of the statistical consulting function at OSU and has had discussion with the new Vice President for Research about this approach. In response to the recommendation that an aggressive program of specialized courses is needed, Smythe responded that the department does not have the manpower to do that in the near term. He agrees that improvements to graduate student computer support are needed and highlighted the “growing pains” as the department adjusts to a new computer support group and as the computer support group develops its expertise. A recent purchase of about ½ dozen computers will result in more computing resources available for graduate students. Smythe stated that he would prefer to provide $20K stipends for graduate teaching assistants, but doing so would limit to 2/3 the amount of teaching assistants required. He noted that the pool of qualified minority students is very small in
quantitative sciences, with almost no progress in the mathematical sciences within the past few years. While they have had some success recruiting Asian-American students, they have difficulty competing with their peers in the recruitment of graduate students of color. Recently, the department has brought consistency between the descriptive text in the Graduate Catalog, their web site and their departmental handbook.

John Selker noted the lack of comprehensive analysis in specialized courses, specifically in the fundamental and critical emerging areas. Hal Koenig indicated that the review team relied on the external reviewers for comments on course work. Selker said that robust and spatial statistics are examples of critical areas that should be developed. Smythe responded that these areas are working their way into the regular curriculum, indicating that STAT 623 and 625 (regression models) have a lot to say about robust statistics. Spatial analysis is an area in which they are considering adding a specialized course, but some content is incorporated in the time series course. In response to Mike Unsworth’s question concerning computational statistics expertise, Smythe indicated the department has several needs. While computational statistics are a part of the skills set needed, it is not at the head of their list. Barbara Bond asked if the department had a prioritization list for new hires. Smythe said that three years ago they had a 5-year hiring plan, but the College of Science was not able to deliver. Currently, they have ideas of what they need in the next one or two hires. Sherm Bloomer, Dean of Science, reported that he typically surveys departments in the spring for their faculty hire needs. He reported that Smythe has been masterful at his role as chair and has been successful in recruiting faculty.

Council action on the graduate program review report was deferred until later in the meeting to accommodate guests that were present for other scheduled agenda items. After the second agenda item was concluded, Pehrsson called for discussion about the Statistics report. Bond asked for an analysis of credit for service courses. Koenig indicated that faculty asked themselves how they were going to teach classes more effectively. After conducting a literature search regarding what should be taught, Dan Schafer wrote a statistics book for that purpose. Koenig hopes to get more data this summer.

Steel asked about the Survey Research Center, indicating that he has been going to Washington State University where he gets a better product at a better price. He speculated that the SRC could be a real money maker. Koenig responded by saying that Statistics is in a zero sum game. Steel stated that the SRC needs to be more cost effective and entrepreneurial. Ciuffetti shared that she came away feeling there was no suggestion about how the situation in Statistics may be alleviated. Sally Francis reminded the Graduate Council that a meeting with the Provost will include a plan of action.

After the third agenda item was concluded, the Council returned to a lengthy discussion regarding strategies that should be undertaken to resolve the problem of adequate support for service courses. The Council asked Koenig to strengthen his recommendation in this regarding the increase of faculty FTE in support of delivery of service courses in statistics and statistical consulting. Graduate Council action on this report was deferred pending this revised recommendation.
II. Biochemistry/Biophysics Graduate Program Review Report

Elaine Pedersen provided a brief overview of the program review report for the graduate program in Biochemistry and Biophysics. She characterized the graduate program in Biochemistry and Biophysics as being successful, citing faculty success in scholarship, honors and awards, research grants and contracts and facilities. Pedersen reported that graduate students and alumni are satisfied with the graduate program. She questioned whether biophysics should remain a part of the department/program name. The perception she heard from the external reviewers is that including it may be a recruitment deterrent. She suggested that the department may want to consider surveying students who were admitted but declined and also consider the possibility of hiring a recruitment consultant. She relayed student concern over examinations and suggested that exams may need to be updated.

P. Shing Ho, chair of Biochemistry and Biophysics, responded by thanking the committee for asking the right questions and providing a balanced report. He distributed a written response, which is appended to these minutes. When describing the department’s efforts to shift its emphasis to reflect more of the biological sciences rather than physical science, Ho indicated that an institute model may provide a larger umbrella. Dan Rockey asked if Molecular and Cellular Biology could serve this need. Ho indicated that Biochemistry and Biophysics will not sell itself to MCB if the overall program is not going to be as strong as MCB is now. While they are open to using MCB as something they can build from, they will not force themselves into an MCB mode. Ho noted that the current method of centralized recruitment for the life sciences lets students choose the program they want once they visit campus. Barbara Bond asked if they envision a life sciences program spanning across colleges. Ho indicated that OSU’s strengths are diluted by the current structure. He contends that combining all life sciences at OSU would result in a program stronger that the University of Washington. John Selker drew an analogy to the Water Resources model, which he indicated has increased the quality of students. Selker questioned the recommendation that the department consider focusing on a few programmatic areas, such as they are already doing with oxidative stress. Pedersen indicated this recommendation was made by one of the external reviewers. Ho said all areas can’t be covered. The department must choose the best scientist they can find or point to an area and fill that area. He contends it is difficult to predict what warrants focus, indicating that some areas may be irrelevant within 5 years. When searches are too narrow, the pool is narrow. Sherm Bloomer, Dean of Science, noted that the department’s strategy has been successful. He stated that much of the life sciences are dependent on collaboration in larger groups. There is a need to find the right place to group people. There are opportunities to establish other groups in the future, such as with physics. Ho said he has tried to collaborate with the chair of the Physics Department for faculty recruitment, start-up packages and space. But Physics ultimately did not invite Biochemistry and Biophysics to participate.

Dale Pehrsson thanked the guests for all their hard work and preparation in conjunction with the graduate program review. She then asked if there was any discussion on either review report.

Bond reflected that is was hard to see how these two programs (Statistics and Biochemistry/Biophysics) could be in the same college. She noted that Biochemistry and
Biophysics’ strategic plan is very thoughtful, but noted a lack of planning in Statistics. Pehrsson indicated it is important to have a plan for recruiting students of color. Ciuffetti stated that their GTA numbers are going down and they are now using undergraduates to assist in courses. Selker reiterated his concerns on the oxidative stress recommendation.

Lynda Ciuffetti made a motion to accept the Biochemistry and Biophysics report as presented. Filtz seconded the motion. The motion passed unanimously.

III. MAIS Follow-up Review Report

Vicki Ebbeck presented an overview of the follow-up review report for the Master of Arts in Interdisciplinary Studies program. She reported that 1/3 of the recommendations have been adopted with the rest in progress. By this time next year, the balance should be completed with one exception. Actions pending include a Category I proposal to establish a Master of Science in Interdisciplinary Studies (MSIS), to create a transition plan relative to the 50% rule, and to establish a few new courses. Ebbeck indicated that the recommendation that was not adopted was to require integration to include three fields of study, each from a different department. The logic was to identify individuals who were truly seeking interdisciplinary degree rather than a surrogate disciplinary program. She believes the reason the current director does not want to implement this recommendation is that a more stringent admission process is being implemented. She cautioned that the Graduate School should provide close oversight to ensure the MAIS is not used as a surrogate program.

Brent Steel stated that the MAIS is implemented differently from department to department and it’s hard to think of it as one degree program. Selker stated that the Applied Anthropology review showed half the students chose the MAIS to avoid the foreign language requirement. He asked what metrics will exist to ensure the same thing doesn’t occur. Ann Schauber, Director of the MAIS program, reported that she is conducting pre-advising up front. She advises students to find faculty who are willing to work with them in an interdisciplinary manner. The metrics will be the outcome of what is reflected in their thesis. Steel indicated that the recommendations are good and he agrees that the recommendation for inclusion of 3 departments should be implemented, though he does see some value in using the degree to incubate new programs. Schauber said that when she looked at the research on interdisciplinary programs, she noted the integration was across three fields of study, not three departments. She said that the process begins with the interest of the student. Francis asked about the safeguards to prevent the MAIS from being used as a surrogate degree. She noted that in her department, students can contact her for advice without going through a graduate program coordinator. She asked if applications will be reviewed only if they go through the program director. Bond asked if there is a program review beyond this review that will compare outcomes to validate on a higher order that the program is doing what we want them to do. She doesn’t think our program reviews are examining outcomes. Francis stated that outcomes are included in the Graduate Council Graduate Program Review Guidelines, but most departments are not prepared to address them. Ebbeck suggested that one approach would be to require three departments in the integration and let the program director make exceptions when warranted.
Pehrsson asked for further discussion. Selker said that it is a good report and he is glad to see the emphasis on requiring three departments.

A motion was made and seconded to accept the follow-up review report for the MAIS program. The motion carried unanimously.

IV. Minutes of the May 5, 2005 Graduate Council Meeting

The minutes from the May 5, 2005 meeting were reviewed by Council members. A motion was made and seconded to approve the minutes as submitted. The motion carried unanimously.

V. Other Business

Pehrsson announced the Dan Brown, the graduate student member of the Graduate Council has resigned due to class conflicts.
Summary of Findings and Recommendations

Findings:

When the University administration talks about OSU, the description typically focuses on research output and includes the phrase “land grant, sea grant, space grant, Carnegie Research Intensive Institute.” Obviously, the Statistics Department plays a vital role in supporting this output as many grants could not move forward without help from the Statistics Department and most graduate programs would feel the pinch if they had to teach their own statistics classes.

In this context, the review committee found a hard-working department of faculty and graduate students. There was clearly a strong feeling of collegiality, a sense of capable leadership and the potential to do much more than they are doing now, if properly supported by the University. In particular, the committee did find several significant problems that constrain the department:

- The first issue is not novel or unique at OSU, but it bears repeating until the administration acknowledges the problem and begins to work earnestly on crafting a solution – the faculty members in this department are underpaid.
- Based on staffing levels for the past decade, the department is understaffed by at least one, if not two, faculty members in the face of rising SCH, advising and consulting.
- The review panel understood that the Agricultural Experiment Station provides funding for the consulting services provided by the Statistics Department, but faculty from other departments also rely on the Statistics faculty as a consulting resource, generally without compensation.
- The teaching, consulting, graduate supervision and committee workload contribute to a “time crunch” for faculty members which makes it difficult for faculty to
  - have adequate time to write applications for competitive grants
  - spend adequate time on scholarship and publications
  - have time to create specialized courses that introduce graduate students to emerging areas in statistics
- The Survey Research Center seems quite capable, yet appears to be understaffed and thus is unable to take advantage of opportunities for more funded work
- Graduate student stipends are among the lowest when compared to peer institutions.

Recommendations:

- The College needs to fund two additional faculty lines (2.0 FTE) in support of delivery of statistics courses and consulting.
- Additional funding from the College of Science must be provided to increase graduate stipends at least 20%.
• Funding for minority scholarships should be found and used for recruiting.
• The Department must decrease the amount of unpaid consulting and the number of graduate committees they serve on.
• Growing the Survey Research Center should be a priority too, especially if it can be accomplished by bringing another faculty member who can share the teaching load while also managing surveys. The presumption is that most of the financial support for this position would come from “soft” money.
• An aggressive program of specialized courses is needed; we recommend offering at least one additional, special topics course per year. This would produce a large benefit for the department as both students and faculty would be exposed to new and emerging topics in statistics.
• Providing adequate computer support for graduate students is imperative.

**PROGRAM REVIEW**

**Committee and Process**

The Statistics Department underwent a Graduate Council Program Review on February 21st, 2005. Members of the Graduate Council Review Committee were:

- Hal Koenig, PhD, Committee Chair (College of Business)
- Tom Adams, PhD, (Department Head, Forest Science)
- Munisamy Gopinath, PhD, (Agricultural & Resource Economics)
- John Boyer, PhD, external reviewer (Department Head, Statistics, Kansas State University)
- Fritz Scheuren, PhD, external reviewer (Vice President for Statistics, National Organization for Research and Computing, and President of the American Statistical Association)

As part of the review process, a self-study report was prepared for the Program Review Committee. The report was delivered to the committee members two weeks prior to the review. The on-campus members of the committee met with Dr. Sally Francis, Dean of the Graduate School to discuss the process and address any questions from the committee. The self-study report, relevant to graduate education, was a compilation of data covering the department mission statement and goals, the profile of graduate applicants, graduate student enrollment and degrees conferred by year, current graduate student funding, department course reaction survey results, sources of funds for department salaries, grants obtained by faculty members, research output by faculty members, coursework required for statistics degrees, comparisons of degree requirements among five comparator universities, course offerings, learning outcomes for the graduate curriculum, information on new initiatives, and Graduate School student surveys. Formal presentations were part of the review, during which the Department chair and various faculty members discussed the work of the department.
During the review, the committee met with the Dean of Science, Sherm Bloomer and faculty and graduate students in the Department of Statistics. A tour of the facilities in Kidder Hall was conducted by Department Chair Robert Smythe.

The Graduate Council Review Committee met with the off-campus committee members following Monday’s schedule of presentations and created a short list of points for the three major sections of this report; Graduate Teaching & Advising, Faculty and Research, and Graduate Students. The on-campus members of the review committee each took the lead on writing one of these sections and all members then reviewed and commented on them.

Background of the Department of Statistics

An historic overview of the Department of Statistics is provided in the self-study report. The Statistics Department receives funding from both the College of Science and the College of Agricultural Sciences. The department was established in 1957 with the authorization to grant a Master of Science Degree in statistics. A doctoral program was authorized in 1965 and a Master of Science in operations research was authorized in 1966.

The department does not offer an undergraduate degree in statistics, but cooperates with the Department of Mathematics and the School of Electrical Engineering and Computer Science to offer a Bachelor of Science in Mathematical Sciences. Concentrations in statistics and operations research are available with this B.S. degree. In addition, the Statistics Department offers an undergraduate minor that can be completed with seventeen required hours of statistics classes and ten additional hours in statistics or ten hours from a number of other departments (OSU General Catalog 2004-2005, Catalog 282, April 2004, page 244). A graduate minor in statistics is also offered.

FACILITIES

The Statistics Department has offices in Kidder Hall. Overall the facilities are in reasonable shape, and the department clearly takes pride in its space. One highlight is a small but nicely maintained and apparently up-to-date library, where numerous journals and technical books were found. Additionally, the department has a good quality seminar/conference room. Faculty offices were generally in reasonable condition. Graduate student offices were in similar condition, although they appeared to be a little crowded. It was also pointed out that some graduate students must be housed in other buildings. The graduate student computing laboratory is also very small. Some amount of additional space for the department in Kidder Hall would be desirable.

ADMINISTRATION

Robert Smythe became department chair in 1999. Positive comments were received by the committee about Robert’s management style and leadership. As an example, a faculty member
had received an offer from another school and stated that in part, the offer was turned-down because of the environment in the department and support provided by Professor Smythe’s leadership.

GRADUATE TEACHING AND ADVISING

Degrees and Student Advising

There are four master’s degrees and one doctoral degree offered by the Statistics Department:

- Master of Arts or Master of Science in Operations Research. For these degrees the thesis is optional. Due to a shrinking number of faculty in this area, the intention is to transfer this program to the Department of Industrial and Manufacturing Engineering over the next several years.
- Master of Arts or Master of Science in Statistics. For these two master’s degrees the thesis is optional.
- Doctor of Philosophy (PhD) in Statistics. Dissertation is required.

Few students come into the statistics program with an undergraduate degree in statistics. Students with backgrounds in mathematics are common in the graduate student ranks but students with degrees in other areas are not uncommon. Students from areas other than mathematics may spend the summer before their first year or part of their first year taking preparatory courses in mathematics or statistics.

All professorial faculty members serve as Graduate Faculty in the role of major professors or committee members on examining committees. Thirty-nine students are currently assigned a major professor across ten faculty members (see Table 1). Of the faculty listed on page 29 of the self-study, Kollath is not graduate faculty and therefore does not serve as a major professor. For the ten faculty supervising students, the range of graduate students is from 2 to 7, with a median of 4 (see Table 1). At the extremes of the range; three professors advise two graduate students, one professor advises six and another advises seven students.

During the faculty meeting with the Graduate Council Review Committee, a professor with an advising load near the median level made a comment about being “maxed-out on PhD advising.” When the review committee spoke with the current graduate students, they mentioned that it was difficult for some students to find a PhD advisor. In addition, faculty members are serving on graduate committees for students from other colleges that have elected to include a minor in statistics in their graduate program. This is consistent with a statement from the self-study (p. 40), “some of our faculty members serve on 20 or more such committees” (emphasis was added by the review committee).

The review committee is very concerned with the faculty’s advising load; at the heart of this issue is the role of minor professor on many graduate committees. At some point, the faculty must limit their service commitment. Ultimately, the department must decide how this is
to happen, but the review committee believes that one possible first step might be to limit the number of minors so faculty can have more time for statistics graduate students and also to work on publications and grants.

The review committee would like to see a creative way to service the need for statistics minors without impacting ST faculty so heavily. For example, could faculty from other departments with statistics expertise fill this role or could a course requirement suffice for the minor with no minor professor on the committee, per se?

There is an annual review of students that provides them with written feedback on their performance if they have been employed as a GTA or GRA. There are, however, a small number of students who are not supported and it is not clear how these students are reviewed.

Classes and Teaching

There is a noted lack of specialized courses. During the review committee meeting with the graduate students, they reported that they did not have many options each term and that some classes were only taught every other year. Both the faculty and students would benefit from having at least one course offered each year on a new or emerging issue, building up to perhaps five new courses over the next four years.

For the 2004 academic year, thirty-two graduate classes were taught (see Table 2a and 2b). Of these thirty-two, twelve were slash courses. Seven of the twelve slash classes were delivered as part of the Statistics Department’s service load to non-majors (e.g., ST411/511, ST412/512, ST421/521). Therefore, of the offerings that statistics students must take for their program of study, only five of twenty-five courses taught in the 2004 academic year were slash courses. For students pursuing an M.S. degree in operations research, the percentage of slash courses is higher – 4 slash course and 9 graduate only courses (these 9 include four 50x classes). It appears that the department is doing a good job of maintaining rigor in its graduate statistics program by offering primarily graduate only classes.

The majority of graduate students come to statistics from elsewhere on campus or from other universities. In the case of an undergraduate student who has a statistics minor, there may be some overlap in the classes, but it appears that enough non-slash classes are offered so the student would not need to take the 5xx version of a 4xx class that was included as part of his/her minor.

The requirements for an MS or PhD in statistics appear reasonable in light of the comparisons presented by the department based on five comparator schools.

Professor Stevens has no assigned teaching FTE. For those assigned FTE in teaching, the lower bound of the range is 0.17 (Pereira) up to 1.0 (Kollath) with a mean and median of 0.44 and 0.38, respectively (see Table 3). In the self-study it was stated that the department’s SCH/FTE ratio is among the three highest in the College of Science, but no estimate was provided. Based on the
FTE figures and SCH values from the self-study and the estimate of teaching FTE, the figure for the Statistics department is nearly 3,000 SCH per FTE. For comparison purposes, in a Graduate Council review conducted last year, it was stated that the university average was around 300 SCH per FTE.

Average and median course evaluations for graduate Statistics courses (page 46) are very good. As these averages include responses from students in service courses (e.g., ST511, 512, 521, 522) these numbers can be considered outstanding.

The review committee was impressed with the commitment to consulting by the department. This is laudable and the opportunity for consulting experience is viewed as incredibly useful for both statistics masters and PhD students. The College of Agricultural Science provides 0.9 FTE for graduate student funding (p. 13) and over 1 FTE for faculty salaries (p. 29) because of their need for statistical consulting. Unfortunately, faculty members from other colleges on campus call on the faculty for statistics consulting and neither their college nor the faculty member pays for this service. To have more time for classes, research and grant writing, faculty members in the department should simply say “no” to consultation requests from faculty who are not in the College of Science or Agriculture unless they are compensated (e.g., written into a grant).

Much of the consulting done by the Statistics Department is with faculty members from departments on campus that primarily use SAS for their research and statistics needs. The review committee found it surprising that SAS was not included in the Learning Outcomes in the self-study report (pages 22-27).

Recognition

Two individuals have been recognized for their teaching/advising/mentoring excellence. One current faculty member and one emeritus faculty are recipients of the Carter Award for Teaching in the College of Science.

One faculty member is the recipient of a Distinguished Achievement Medal from the Environmental Section of the American Statistical Association and several students have received student paper recognition, also from the American Statistical Association.

Student and Alumni Feedback

Responses to the student survey distributed by the Graduate School to those currently enrolled indicated that individuals were generally satisfied. Of those items that focused on graduate teaching and advising, the mean for a few of the items was below 4.0 (1=Strong Disagree, 5=Strongly Agree), but the majority were over 4.0. Lower rated items included initial advising (item #12), receiving research and professional development guidance (#15), gaining teaching experience (#23), and teaching assignments being made equitably (#24). Unfortunately, only 14 students returned a survey – just a third of the graduate student population – making these results hard to interpret by themselves.
The one issue that came up in discussions with the graduate students that reflects the survey results was advising. When students were initially asked about advising, they responded favorably, but when the discussion continued, it appeared that some information was hard to find or unavailable. In particular, graduate students mentioned the desirability of having the schedule of classes for at least twelve to fifteen months into the future; this would be especially helpful for classes that are taught every other year. It would be useful to ask students about the specific information they have had trouble finding and create one central location for this information. For example, a departmental handbook printed once a year and a website that can be updated on short notice could serve this purpose.

Responses to the exit survey conducted by the Graduate School for students who graduated between AY2002 and AY2004 were quite positive. It was very rare for any of the alumni to respond with a negative response to a question. In fact, if they could start their degree program again, ten of eleven would choose the same major, nine of eleven would choose the same degree and ten of eleven would choose the same major professor.

From a survey done by Statistics of all graduate alumni living in the U.S. for which addresses were available, the responses were also favorable. The few negative responses related to teaching and advising included two of thirty-six alumni who were “somewhat dissatisfied” with teaching, one of thirty-six was “somewhat dissatisfied” with the quality of course content, five of thirty-six were “somewhat dissatisfied” with the availability of classes, six of thirty-six were “somewhat dissatisfied” with the variety of classes, and one of thirty-six were “somewhat dissatisfied” with testing and grading practices. When asked to grade the statistics graduate program, there was one “C+,” one “B-,” two “B’s” and all other grades were higher with a mode of an “A” from ten of the thirty-six respondents.

The surveys support comments from the current graduate students who said that they liked the faculty and found them easy to approach and talk to. When we spoke with the faculty members it was very comfortable with each other and supportive of each other’s role. In our experience this outcome is almost certainly not a coincidence. This is a leadership issue as well as a hiring issue – the leadership sets the tone and in hiring decisions you not only find outstanding scholars, but also individuals that fit the culture of the department.
FACULTY AND RESEARCH PROGRAMS

Faculty and Staff Resources

The Statistics Department currently has fourteen faculty, of which ten are in the professorial ranks and four are research associates (2; 1.25 FTE) and assistants (2; 1.30 FTE). The College of Science accounts for much of the professorial FTE (6.16 FTE, 12 month equivalent), while the College of Agriculture and grant funds support the remainder (0.96 and 0.95 FTE, respectively). The Department also has three classified staff (2.25 FTE).

Between 2000 and 2005 the Department lost four professorial faculty (three full professors and one associate professor), mostly to retirements. Additional retirements are expected in the next five years that may total as many as three of the current faculty. A search process has been recently completed for two new hires – an assistant professor and an instructor – and the Department hopes to hire another assistant professor to begin in the fall of 2006, subject to approval by the College of Science.

Resource Constraints. The loss of professorial faculty has significantly increased the teaching and advising load among current faculty. The new professorial hire and instructor will help offset some of the resource problems and the Department Chair is confident about making a strong case for an additional hire to start in the fall of 2006. However, upcoming sabbaticals and retirements will negatively affect the Department’s tradition of offering outstanding academic programs in statistical theory and methods. The load of core and service classes strain current resources leaving little for special topics courses, which limits graduate students’ ability to specialize and explore new areas in statistics.

Many students expressed a concern about the limited availability of Ph.D. thesis advisors in the Department and this was noted in the self-study (p. 4). A doctoral student appears to have left the Department last year due to the inability to find an advisor. It appears to the review committee that the Department faces two options to address this problem; 1) they must find ways to cut their advising and/or consulting load, or 2) focus on increasing the number of teaching faculty. The department may need to pursue both options to assure that the quality of graduate education does not suffer.

Related to our concern with the number of faculty is the issue of funding to support consulting services. In our conversation with the Dean, he strongly encouraged the Department to submit proposals to the College for initial funding of positions which can break-even and sustain themselves in 3-5 years (e.g., additional resources for the Survey Research Center). This funding may be a component in crafting a solution to decreasing the consulting load.

Faculty salaries. Unfortunately, this Department is an example of the University-wide problem with salaries. There were several comments made to the review committee regarding both the difficulty in hiring and the failure of the department to keep pace with the normal sort of seniority/cost-of-living increases that are given elsewhere.
The review committee was given access to the salaries, without names attached. Faculty salaries were compared with data collected and provided by the American Statistical Association (ASA), the largest organization of statisticians in the United States. In the December 2004 issue of The Amstat News, the official newsletter of the ASA, the association published selected quartiles for salary figures for academic statisticians at research universities across the U.S., with distinctions made by academic rank and years in rank.

With the exception of the department chair, all salaries were below the first quartile (25th percentile) of academic statisticians with the same rank and similar years in rank. These values missed the first quartile by amounts ranging from approximately $1,000 to nearly $20,000, with the problem worsening as rank increased. In the one case where the salary was not below the first quartile, the department chair’s salary was still below the median for faculty with similar experience by almost $9,000, even if, as we assume, he is being paid an additional stipend for his work as chair.

This situation makes it difficult to hire good new faculty, and even more difficult to compete in the business of retaining the really strong faculty members. Salary compression (i.e., senior people making less or only barely more than their junior colleagues) is a big problem in the department; it has the potential to be divisive and can have an adverse effect on morale.

Faculty Diversity

The current faculty represents a broad range of interests and institutions from which they received their degrees. Many faculty are interested in statistical theory, while others are interested in applications to medical, environmental, agricultural and related sciences. Recent hires are from top-ranked schools that provide good theoretical and applied training in statistics (e.g., Pennsylvania State, Cornell, Carnegie Mellon). There is broad gender diversity – the review committee views it as a “plus” that women represent 40% of the professorial faculty.

Individuals of color represent a relatively small proportion of the professorial faculty. The nature of statistics graduate programs across the country (e.g., increased enrollment of foreign nationals, relatively few graduates from the people of color or Hispanic origin or other groups) presents a significant challenge. The Department Chair has expressed a commitment to ensuring a broad ethnic and gender diversity. However, we would like to see the process to get to this end.

Research Programs

The Statistics Department’s research program exhibits a wide array of interests from theory to applications in a wide variety of disciplines; the publication record reflects those interests. Faculty have published in such prestigious journals as Journal of the American Statistical Association, Biometrika and Biometrics. At the same time, excellent applications of statistical methods
by faculty have resulted in publications in top journals of other disciplines like *Journal of Environmental Economics and Management, Ecology, Plant Physiology, Mutation Research* and others. Faculty publications since 2000 total about eighty-five journal articles, which is an average of approximately two publications per faculty member per year. Faculty presentations at meetings and by invitation show a record similar to that of publications (an average of two per faculty member per year).

The Department has received a number of sponsored research grants individually and in cooperation with other departments in the University and other universities. Dr. Stevens, Dr. Lesser and Dr. Pereira, and more recently Dr. Qu and other new faculty, have been very active in sponsored research. The grants average over the past 4 years is about $800,000 per year not including the contracts received by the Survey Research Center.

Not surprisingly, the high level of productivity has resulted in a number of awards to faculty. Several current members of faculty are Fellows of the American Statistical Association and the Institute for Mathematical Statistics. Other notable accomplishments include a NSF Career award, and teaching and distinguished achievement honors. The placement of MS and Ph.D. graduates in Fortune 500 companies and government agencies reflect the strength of the training provided by the Department’s faculty.

*Interdisciplinary research’s impact on rankings and its consequences.* The Department had a top 40 ranking the last time the National Research Council (NRC) carried out rankings. The Department Chair acknowledged that the loss of professorial faculty (who published in theoretical journals) and the increased emphasis on interdisciplinary research will likely place the Department in a lower tier in the next NRC rankings. These factors might have also contributed to fewer placements of graduates in academia. Lack of teaching resources inhibits specialization, but the **Department may want to consider how the ranking change may affect its ability to attract and retain good students and faculty.** Middle ground could be found here if the department decided to specialize in an area like environmental statistics. The department’s ability to work with the science faculties involved across campus and the Environmental Health Sciences Center nearby are key ingredients – the department could go make a name here. The drop in NRC rankings in terms of attracting new faculty members and graduate students will hurt, of course, but recognition (if at the highest level), even if only in one specialization can make up for some of that.

Given the high level of teaching, advising and consulting loads of the faculty, **research productivity is quite respectable, on average, but there seems to be an uneven publication presentation record.** A few faculty publish in theory journals which are key to the national visibility of the Department, while a fairly large share of faculty publish in journals of other disciplines. Since 2000, the number of publications has ranged from three to eighteen per faculty. Part of the problem is limited time, but we **encourage all faculty to continue to strive for publications in high-quality journals.**

**Grant productivity is very good on average but there seems to be an uneven award record.** The grants average over the past four years ($800,000 per year) is **strong** primarily due to the
EPA STAR grant ($3 million over five years). However, of late, the younger faculty have increased their grant activity. The college and administration’s view is that the Department’s grant record is uneven and can be improved with participation from a larger share of faculty. While we recognize that not every faculty member is an entrepreneur, the budgets of state-assisted universities necessitate a change in the traditional roles of a faculty member.

Overall, the review committee is concerned that the number of professorial faculty in the department has shrunk over the last few years (p. 29). Tenure-track positions from 1990 to 2000 appear to have been relatively stable at 11-12. However, in 2005 there are only 8 tenure track positions, with an offer outstanding to an applicant that would start in the fall of 2005. Even if an assistant professor is hired for the fall of 2005 and the chair is successful in lobbying for another hire next year, this still leaves the department approximately two faculty members short of their traditional strength – in the face of rising student credit hours and no apparent cut back in the teaching, advising/graduate committee membership or consulting load (see Figure 1).

**GRADUATE STUDENTS**

Graduate education in the Department of Statistics is primarily intended to train students for careers as applied statisticians (M.S. level) and for teaching, research and consulting (Ph.D. level). Consistent with the land grant mission of the University, the graduate program in Statistics emphasizes statistical methodology, but with a strong grounding in theory, especially at the Ph.D. level. Through a consulting practicum, all students obtain experience in statistical consulting. This not only provides a significant service to other students across campus, but greatly aids statistics graduate students in developing problem solving, analytical, and communication skills.

In the remainder of this section, we provide observations on several aspects of graduate education in the Department: 1) student recruitment; 2) quality and retention of students; 3) student support; 4) employment of graduates; and 5) current student and alumni satisfaction with the program. These observations are based on the self-study materials supplied by the Department, including the results of three surveys (current students, Graduate School Exit Survey, alumni survey), and interviews conducted in February during our visit to the Department.

**Student Recruitment** – In the past five years the number of applicants for graduate study in Statistics has ranged from 59-94 (mean 87), the number admitted has ranged from 43-78 (mean 59) and the number enrolled has ranged from 11-16 (mean 14). Typically, the great majority of students enrolled each year are M.S. students (typically 12); only a handful are Ph.D. students (around 2). The Department has no stated admission criteria except good grades in calculus, linear algebra and introduction to mathematical statistics. Admitted applicants, however, come from a variety of academic backgrounds, some strong in math, and others with less math but with more training in various scientific applications. It is felt that the Department benefits from this mix of two kinds of students.

The self-study does not provide a quantitative assessment of trends in academic qualifications of applicants in the past five years (only averages over this entire period). Concern about the quality of applicants, however, led to faculty visitations at four Northwest Colleges and Universities
in 2004 to promote the program, and to subsidizing the visits of promising applicants to campus in order to meet faculty and students in the Department. The intent is to continue these efforts in the future, as well as improve the Department’s website to make it more informative and attractive. We certainly applaud and support these efforts to enhance recruitment of the best students.

In terms of diversity, about one-third of the new students enrolled each year are international students, and the gender mix is about equally split between males and females. While the Department has attempted to recruit underrepresented groups (e.g., Blacks, Native Americans, Hispanics), this goal was recognized as difficult and perhaps unattainable without a major new effort.

Quality and Retention of Students - The total number of students has varied little over the past five years (thirty-five to forty), with a current student body of forty. The fraction of graduate students who are in the Ph.D. track, as opposed to the M.S track, has risen steadily from 2000, when Ph.D. students accounted for about 15% of the graduate student population, to the present time where they account for about 40%. Since the proportion of newly admitted graduate students who are brought directly in on the Ph.D. track has not varied significantly over the years, the increase in the proportion of students studying in the department who are in the Ph.D. program must be a function of the longer period of time to graduate (median five years (Ph.D.) vs. one and a half years (M.S.)) and some students progressing directly from the M.S. into the Ph.D. program. Currently nine of the fourteen Ph.D. candidates are international students.

Retention of students in the program has been excellent. It appears that only a couple of M.S. students failed to complete the M.S. program in the past five years, and no Ph.D. student that has advanced to candidacy (after passing the comprehensive exams) has withdrawn since 1999 (although 2 Ph.D. students have moved away to take jobs, with the intention of completing their dissertations off-campus). This high rate of retention is no doubt a reflection of the high quality of students enrolled in the program (average undergraduate GPA 3.7). Other evidence of student excellence is the high praise collectively given to students by faculty when we met with them, and the array of highly competitive University and professional society awards received by students in recent years.

Student Support - Twenty-six of the forty current students receive some assistantship. Most are supported at 0.45 FTE with either a nine month Graduate Teaching Assistantship (GTA) or a twelve month Graduate Research Assistantship (GRA). Both have the same monthly stipend of $1277, with a tuition waiver and insurance coverage. Although this level of support is roughly on par with graduate students in other colleges at OSU, it is the lowest of nine comparator institutions in the self-study report. Surely, this comparatively low level of support hinders the Department’s ability to recruit the very best students into its program. The Department attempts to compensate by providing additional fellowship awards to the most promising students. The self-study mentioned that the goal is to increase this effort in the future. It is unclear why there is only one rate for both M.S. and Ph.D. students. Other units on campus provide larger stipends to Ph.D. students.
Employment of Graduates - It appears that graduates in Statistics have been quite successful in finding jobs in their chosen field. Forty-nine students graduated with an M.S. in the past 5 years, of which employment information is available for 26. Nearly all of these individuals were placed in statistics-related positions. Employment information is available for 11 of the 12 Ph.D. students who graduated in this same period; all of these alumni are involved in research positions and several have teaching responsibilities as well. We would have liked the M.S. data to be more complete and are surprised that more is not known, especially since continuing contact by the Department with its former students can be an important source of academic enrichment for both faculty and student currently enrolled in the program.

Satisfaction with the Program - Interviews with current students, and surveys of current and exiting students, and alumni, were consistent in their praise of many aspects of the graduate program. Students and alumni generally expressed a great deal of satisfaction with the quality of teaching and advising, rigor of the program, access and interactions with professors, opportunity for consulting (through the practicum), opportunity for teaching experience (and fairness of assignments), administration of program examinations, the departmental seminar, and the consulting practicum. It was also evident in the interviews with faculty and students that there is a great deal of respect between these groups and good rapport. There was a great deal of candor and humor in our sessions and every evidence that that the praise was genuine.

Nonetheless, dissatisfaction was expressed by students in four areas: 1) GTA/GRA stipends, 2) office facilities, 3) computing facilities, and 4) grading of assignments by other students. The need for improved stipends has already been discussed above. Complaints about office space is universal among graduate students (and faculty for that matter) across campus, but the Department Chair should follow-up with the students on this issue to make sure there is not a significant concern that could be rectified in some way.

The self-study addresses the concern about computing facilities, but suggested the problem was mostly the result of recent consolidation of computing administration in the College, which is working itself out. Our discussion with students indicated that the problem lies more with antiquated hardware (i.e., PCs and printers), which is compounded by reduced computing support resulting from the consolidation. It is ironic that a program wishing to further emphasize analysis of large, complex data sets does not have the most advanced computing hardware available. We suggest the Department look into leasing of PCs and peripherals. This is a means to having the latest hardware, at a fairly economical cost.

The last issue concerns discomfort among students in both evaluating and being evaluated by close peers. Apparently, GTAs in some graduate courses end up grading assignments of other statistics graduate students. The concern seems mostly to be where one M.S. student is grading another, and not when Ph.D. students grade the work of M.S. students. This concern seems to be a relatively easy to fix and we recommend action be taken.

One last point; problems, such as the weaknesses in departmental computing, were openly and constructively discussed. In fact, we found morale very high, with a real spirit of community evident.
APPENDICES

FIGURE 1

![Bar Chart: Department SCH]

- **AY2000**: Graduate SCH: 3078, Undergraduate SCH: 7653
- **AY2001**: Graduate SCH: 3123, Undergraduate SCH: 8072
- **AY2002**: Graduate SCH: 2909, Undergraduate SCH: 9141
- **AY2003**: Graduate SCH: 3526, Undergraduate SCH: 9548
- **AY2004**: Graduate SCH: 3222, Undergraduate SCH: 9964

Legend:
- □ Graduate SCH
- □ Undergraduate SCH
TABLE 1

Table 1 and 2 are from information received 17 February 2005 from Robert Smythe in response to an e-mail request from Hal Koenig.

**Graduate Students organized by Major Professor**

<table>
<thead>
<tr>
<th>Major Professor</th>
<th>PhD:</th>
<th>MS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthur</td>
<td>Aimee Taylor;</td>
<td>Jessica Merville</td>
</tr>
<tr>
<td>Gitelman</td>
<td>Kathi Georgitis; Charles Gerringer, Susan Hornsby, Hee Bun Lee</td>
<td></td>
</tr>
<tr>
<td>Lesser</td>
<td>Leigh Ann Harrod; Fred Schaefer, Yu Gyung Kang, Mari Rossman</td>
<td></td>
</tr>
<tr>
<td>Madsen</td>
<td>Joy Toyama, Lama Al-Khatib</td>
<td></td>
</tr>
<tr>
<td>Murtaugh</td>
<td>Dongxing Yang, Joe Scherer; Stanley Leung, John Henry, Qiang Pu, Mike Perozzi</td>
<td></td>
</tr>
<tr>
<td>Pereira</td>
<td>Waseem Alnosier, Roman Gulati, Michael Polakowski, Lihong Wang</td>
<td></td>
</tr>
<tr>
<td>Qu</td>
<td>Cindy Tsai, Lin Lu, Yuying Jin; Nick Som</td>
<td></td>
</tr>
<tr>
<td>Schafer</td>
<td>Vicente Monleon, Yonghai Li, Jack Giovanini; Brandt Balgooyen, Jingmin Liu, Shane Moser, Xianlong Wang</td>
<td></td>
</tr>
<tr>
<td>Smythe</td>
<td>Uran Chu; Raghavendran Nagarajan, Catherine Miller, Thomas Miller</td>
<td></td>
</tr>
<tr>
<td>Stevens</td>
<td>Cynthia Cooper; William Gaueman</td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td>Courses</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td>Arthur</td>
<td>ST 483/583 (Fall); ST 443/543 and ST 585 (Winter)</td>
<td></td>
</tr>
<tr>
<td>Birkes</td>
<td>ST 541 (Fall); ST 651 (Winter); ST 652 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Carroll</td>
<td>ST 553 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Gitelman</td>
<td>ST 552 (Winter); ST 565 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Lesser</td>
<td>ST 431-531 (Fall); ST 412/512 (Winter)</td>
<td></td>
</tr>
<tr>
<td>Madsen</td>
<td>ST 421/521 (Fall); ST 412/512 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Murtaugh</td>
<td>ST 411/511 (Fall); ST 422/522 and ST 435/535 (Winter); ST 415/515 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Pereira</td>
<td>ST 507/509 (Fall, Winter, Spring, Summer); ST 555 (Fall)</td>
<td></td>
</tr>
<tr>
<td>Qu</td>
<td>ST 663 (Fall), ST 599 (Longitudinal Models, Winter); ST 563 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Ramsey</td>
<td>ST 411/511 (Winter); ST 413/513 (Spring)</td>
<td></td>
</tr>
<tr>
<td>Schafer</td>
<td>ST 551 and ST 623 (Fall); ST 625 (Winter)</td>
<td></td>
</tr>
<tr>
<td>Smythe</td>
<td>ST 561 (Fall); ST 562 (Winter)</td>
<td></td>
</tr>
<tr>
<td>Stevens</td>
<td>ST 571 (Fall)</td>
<td></td>
</tr>
</tbody>
</table>

ST 4xx/5xx – Yellow highlighting denotes class that is taught for non-majors
TABLE 2b
Graduate classes offered 2003–4, organized by term

<table>
<thead>
<tr>
<th>Term</th>
<th>Instructor</th>
<th>Course #</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Birkes</td>
<td>541</td>
<td>Probability, Computing, And Simulation In Statistics</td>
</tr>
<tr>
<td>Fall</td>
<td>Schafer</td>
<td>551</td>
<td>Statistical Methods</td>
</tr>
<tr>
<td>Fall</td>
<td>Pereira</td>
<td>555</td>
<td>Advanced Experimental Design</td>
</tr>
<tr>
<td>Fall</td>
<td>Smythe</td>
<td>561</td>
<td>Theory Of Statistics</td>
</tr>
<tr>
<td>Fall</td>
<td>Stevens</td>
<td>571</td>
<td>Environmental Sampling</td>
</tr>
<tr>
<td>Fall</td>
<td>Schafer</td>
<td>623</td>
<td>Generalized Regression Models</td>
</tr>
<tr>
<td>Fall</td>
<td>Qu</td>
<td>663</td>
<td>Advanced Theory Of Statistics</td>
</tr>
<tr>
<td>Fall</td>
<td>Murtaugh</td>
<td>411/511</td>
<td>Methods Of Data Analysis</td>
</tr>
<tr>
<td>Fall</td>
<td>Madsen</td>
<td>421/521</td>
<td>Intro To Mathematical Statistics</td>
</tr>
<tr>
<td>Fall</td>
<td>Lesser</td>
<td>431/531</td>
<td>Sampling Methods</td>
</tr>
<tr>
<td>Fall</td>
<td>Arthur</td>
<td>483/583</td>
<td>Nonlinear Optimization</td>
</tr>
<tr>
<td>Fall</td>
<td>Pereira</td>
<td>507/509</td>
<td>Seminar/Consulting Practicum</td>
</tr>
<tr>
<td>Winter</td>
<td>Gitelman</td>
<td>552</td>
<td>Statistical Methods</td>
</tr>
<tr>
<td>Winter</td>
<td>Smythe</td>
<td>562</td>
<td>Theory Of Statistics</td>
</tr>
<tr>
<td>Winter</td>
<td>Arthur</td>
<td>585</td>
<td>Topics In Operations Research</td>
</tr>
<tr>
<td>Winter</td>
<td>Qu</td>
<td>599</td>
<td>Special Topics</td>
</tr>
<tr>
<td>Winter</td>
<td>Schafer</td>
<td>625</td>
<td>Generalized Regression Models</td>
</tr>
<tr>
<td>Winter</td>
<td>Birkes</td>
<td>651</td>
<td>Linear Model Theory</td>
</tr>
<tr>
<td>Winter</td>
<td>Ramsey</td>
<td>411/511</td>
<td>Methods Of Data Analysis</td>
</tr>
<tr>
<td>Winter</td>
<td>Lesser</td>
<td>412/512</td>
<td>Methods Of Data Analysis</td>
</tr>
<tr>
<td>Winter</td>
<td>Murtaugh</td>
<td>422/522</td>
<td>Intro To Mathematical Statistics</td>
</tr>
<tr>
<td>Winter</td>
<td>Murtaugh</td>
<td>435/535</td>
<td>Quantitative Ecology</td>
</tr>
<tr>
<td>Winter</td>
<td>Arthur</td>
<td>443/543</td>
<td>Applied Stochastic Models</td>
</tr>
<tr>
<td>Winter</td>
<td>Pereira</td>
<td>507/509</td>
<td>Seminar/Consulting Practicum</td>
</tr>
<tr>
<td>Spring</td>
<td>Carroll</td>
<td>553</td>
<td>Statistical Methods</td>
</tr>
<tr>
<td>Spring</td>
<td>Qu</td>
<td>563</td>
<td>Theory Of Statistics</td>
</tr>
<tr>
<td>Spring</td>
<td>Gitelman</td>
<td>565</td>
<td>Time Series And Spatial Statistics</td>
</tr>
<tr>
<td>Spring</td>
<td>Birkes</td>
<td>652</td>
<td>Linear Model Theory</td>
</tr>
<tr>
<td>Spring</td>
<td>Madsen</td>
<td>412/512</td>
<td>Methods Of Data Analysis</td>
</tr>
<tr>
<td>Spring</td>
<td>Ramsey</td>
<td>413/513</td>
<td>Methods Of Data Analysis</td>
</tr>
<tr>
<td>Spring</td>
<td>Murtaugh</td>
<td>415/515</td>
<td>Design And Analysis Of Planned Experiments</td>
</tr>
<tr>
<td>Spring</td>
<td>Pereira</td>
<td>507/509</td>
<td>Seminar/Consulting Practicum</td>
</tr>
</tbody>
</table>

4xx/5xx – Yellow highlighting denotes a class that is taught for non-majors
**TABLE 3**  
Calculation of SCH/FTE Ratio

<table>
<thead>
<tr>
<th>Appointment</th>
<th>Appointment (months)</th>
<th>9 month FTE</th>
<th>Percent Teaching</th>
<th>Teaching FTE on 9 month basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthur</td>
<td>9</td>
<td>1.0</td>
<td>55.00%</td>
<td>0.550</td>
</tr>
<tr>
<td>Gitelman</td>
<td>12</td>
<td>0.75</td>
<td>30.00%</td>
<td>0.275</td>
</tr>
<tr>
<td>Kollath</td>
<td>11</td>
<td>1.0</td>
<td>85.00%</td>
<td>1.039</td>
</tr>
<tr>
<td>Lesser</td>
<td>12</td>
<td>0.95</td>
<td>30.00%</td>
<td>0.348</td>
</tr>
<tr>
<td>Madsen</td>
<td>9</td>
<td>1.0</td>
<td>50.00%</td>
<td>0.500</td>
</tr>
<tr>
<td>Murtaugh</td>
<td>9</td>
<td>1.00</td>
<td>50.00%</td>
<td>0.500</td>
</tr>
<tr>
<td>Pereira</td>
<td>12</td>
<td>0.95</td>
<td>15.00%</td>
<td>0.174</td>
</tr>
<tr>
<td>Qu</td>
<td>12</td>
<td>0.75</td>
<td>30.00%</td>
<td>0.275</td>
</tr>
<tr>
<td>Schafer</td>
<td>9</td>
<td>1.00</td>
<td>40.00%</td>
<td>0.400</td>
</tr>
<tr>
<td>Smythe</td>
<td>12</td>
<td>1.0</td>
<td>30.00%</td>
<td>0.367</td>
</tr>
<tr>
<td>Stevens</td>
<td>12</td>
<td>0.95</td>
<td>0.00%</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*No adjustment was made for an 11 month appointment – this value should be slightly lower.*

Total Teaching FTE: 4.4280105  2977.86
### TABLE 4a
Comparison of Masters programs with other land-grant institutions

<table>
<thead>
<tr>
<th>Masters Degree</th>
<th>Stat Mtds</th>
<th>Stat Thy</th>
<th>Gen Regr Models</th>
<th>Prob/Sim</th>
<th>Consult</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSU</td>
<td>30 weeks</td>
<td>30 weeks</td>
<td>10 weeks</td>
<td>10 weeks</td>
<td>10 weeks</td>
<td></td>
</tr>
<tr>
<td>Iowa St</td>
<td>30 weeks</td>
<td>30 weeks</td>
<td></td>
<td></td>
<td></td>
<td>1 credit (semester) orientation to software</td>
</tr>
<tr>
<td>Penn St</td>
<td>30 weeks</td>
<td>30 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td>15 weeks stochastic processes</td>
</tr>
<tr>
<td>NC St</td>
<td>15 weeks</td>
<td>30 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td>15 weeks sampling thy, 15 weeks linear models, 15 weeks categorical data OR survival data</td>
</tr>
<tr>
<td>CO St</td>
<td>30 weeks</td>
<td>30 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td>15 weeks applied linear models, 15 weeks linear model thy, 15 weeks sampling mtds OR exp design</td>
</tr>
<tr>
<td>Kansas St</td>
<td></td>
<td>30 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td></td>
</tr>
</tbody>
</table>

Based on information from page 18 in self-study

### TABLE 4b
Comparison of PhD programs with other land-grant institutions

<table>
<thead>
<tr>
<th>PhD Degree</th>
<th>Adv Stat Thy</th>
<th>Lin Model Thy</th>
<th>Survival Analysis</th>
<th>Real Analysis</th>
<th>Meas-Theor Prob</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSU</td>
<td>30 weeks</td>
<td>20 weeks</td>
<td>10 weeks</td>
<td>10 weeks</td>
<td>10 weeks</td>
<td>10 weeks consulting/year</td>
</tr>
<tr>
<td>Iowa St</td>
<td>15 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td></td>
<td>15 weeks computational statistics</td>
</tr>
<tr>
<td>Penn St</td>
<td>30 weeks</td>
<td>15 weeks</td>
<td></td>
<td>15 weeks</td>
<td></td>
<td>15 weeks asymp tools (adv thy) and consulting</td>
</tr>
<tr>
<td>NC St</td>
<td>30 weeks</td>
<td>*15 weeks req’d in MS</td>
<td>*option in MS</td>
<td>30 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO St</td>
<td>15 weeks</td>
<td></td>
<td></td>
<td>15 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kansas St</td>
<td>15 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Beyond masters req.</td>
</tr>
</tbody>
</table>


BIOCHEMISTRY AND BIOPHYSICS
GRADUATE COUNCIL PROGRAM REVIEW 2005

Summary of Findings and Recommendations

The Graduate Program in the Department of Biochemistry and Biophysics is a highly successful academic research unit. Several members of its faculty have been recognized at various levels for their research accomplishments at many levels. The Department has developed a solid graduate program offering both M.S. and Ph.D. degrees. The faculty and staff and the programs make a substantial contribution to research and teaching at OSU; the prospect for future contribution is great.

The Department has actively participated in several interdepartmental programs, including the Linus Pauling Institute, the Environmental Health Science Center, the Center for Gene Research and Biotechnology, and the Molecular and Cellular Biology Program. The interdisciplinary collaborations expand the strengths and research breadth of the Department, providing intellectual stimulation for faculty and students alike as well as providing additional recruitment and research funding opportunities.

Alumni satisfaction is generally high. Graduating students appear to receive good guidance and help in finding suitable post-doctoral positions as well as opportunities in industry.

The following recommendations are offered from the perspective of ensuring that the Department’s Graduate Program maintains its present high quality level and at gains in strength.

Recommendations:

Graduate Students and Graduate Curriculum

It is recommended that the Department make use of its current graduate students in recruitment activities and other department activities. For example, they could advise and assist more in recruiting future graduate students by helping with items such as web page design and by undertaking speaking engagements. They could take more of a lead in organizing seminar series and in developing a journal club.

It is recommended that the Department should study the reasons for the drop in the number of women students and take appropriate remedial actions. Also strong actions must be taken to actively encourage and recruit Hispanics and African Americans. The undergraduate population at OSU is an obvious recruitment pool, but the faculty might also network with other undergraduate institutions and encourage their students of all races and genders to apply to OSU.
It is recommended that a formal or informal survey of students who decline admittance offers needs to be carried out. These applicants could be asked about specific reasons for their decision not to come to OSU including assistantship stipends, required coursework, and the match between their research interests and faculty in the department. It is also recommended that the Department needs to seek further advice through a recruitment consultant to identify best methods for determining what works and what doesn’t work well in recruitment.

It is recommended that the Department consider whether recruiting from their undergraduates might be an option that should be more actively pursued.

It is recommended that the faculty develop a variety of opportunities at which students may interact across the Department with fellow students and department faculty.

It is recommended that the Department begin to systematically collect data that would enable the Department to explore whether the use of the word “biophysics” in the Department title promotes or deters the recruitment of graduate students.

It is recommended that students be made aware of the dollar amount of student fees when they are sent information about their admittance into the program and the offer of a GTA position.

Several recommendations relate to the need for the department to consider what outcomes it desires of its graduate programs. After determining what outcomes are desired and needed it is recommended that the Department consider revamping its core requirements, that the Department review the preliminary doctoral examinations, and that the department consider offering technical writing, bioanalytical methods, and grantsmanship courses.

Graduate Student and Faculty Interaction

It is recommended that methods for improving intra-departmental communications is developed. As a corollary to this it is recommended that the Department review its policies regarding graduate students’ lab experiences and that these policies are clear to both faculty and graduate students.

Faculty and Faculty Performance

If it is the desire of the Department and the College of Science that the Department of Biochemistry and Biophysics retain and improve its national standing related to grant funding and research activities it is recommended that additional faculty positions (1 or more) be enabled for the Department.

It is recommended that the Biochemistry and Biophysics Department take advantage of every possible opportunity for new hires, be it in their own department, the collaborative interdisciplinary programs in which they participate, or in any other department within the College of Science.
It is recommended that in addition to targeted expertise, the Department should also consider focusing on a few programmatic areas, such as they are already doing with oxidative stress.

Quality of Outcomes
It is recommended that the Department find other metrics (funding per faculty, papers per faculty, research impact, quality of undergraduate and graduate students, and so forth) to use as a more frequent measure of the department’s national stature. This decision needs to be consistent with the means by which the Department is evaluated by the Dean and the University.
Program Review

Committee Process
On February 23, 2005, a Graduate Council review team visited the Department of Biochemistry and Biophysics to conduct a full program review of the Graduate Program in Biochemistry and Biophysics. Team members were:

- Elaine Pedersen, College of Health and Human Sciences (Design and Human Environment), Chair
- Prasad Tadepalli, School of Electrical Engineering and Computer Science
- Mike Unsworth, College of Oceanic and Atmospheric Sciences (Atmospheric Sciences)
- Fran Jurnak, Department of Physiology and Biophysics, University of California - Irvine
- Gary Schroth, Solexa Inc., Hayward, CA

Several of the internal (OSU) members of the review team participated in a pre-review meeting held February 15, 2005. The Biochemistry and Biophysics Graduate/Undergraduate self-study report was provided to the review committee. The site visit provided the review committee an opportunity to meet with P. Shing Ho, Department Chair; Jack Higginbothan, Research Office; Sherm Bloomer, Dean, College of Science; Graduate faculty; and with fourteen graduate students. Reports from Fran Jurnak and Gary Schroth were forwarded to the review committee chair following the site visit and then incorporated into the report. The full report was shared with the committee. Individual committee members took responsibility for writing particular sections of the program review. All committee members have read the final version of the review for factual accuracy.

Overview
The Biochemistry and Biophysics Department at Oregon State University is one of the most successful academic research units on campus and its faculty members have been recognized for research accomplishments at many levels. The Department has a solid graduate program. Both M.S. and Ph.D. degrees are offered; most graduate students are pursuing doctoral degrees. Current graduate students were attracted to the Department because of its national research reputation and the reputation of specific faculty, the research facilities, and the availability of biophysics together with biochemistry.

All graduate students take three core Biochemistry courses, three core Biophysics courses, and a Graduate Seminar. Positive responses related to overall satisfaction with the program were received from a survey of alumni.

The relocation of the Linus Pauling Institute (LPI) to OSU in 1997 has positively benefited the Department. Three members of LPI are also affiliated with the Department: Dr. Balz Frei, Director of the Center and Professor of Biochemistry and biophysics, Tory Hagen, LPI Faculty and Associate Professor of Biochemistry and Biophysics, and Joseph Beckman, Ava Helen Pauling Chair in LPI and Professor of Biochemistry and Biophysics (he recently assumed the Directorship of the Environmental Health Sciences Center). All three are integral to the Department and contribute to the classroom teaching and research training missions of the Department.
Description of the Program

Students
The Department mainly focuses on Ph.D. degrees. There is a notable under-representation by women. There are currently 23 graduate students in the graduate program; 21 seeking the Ph.D.; and 2 seeking the M.S. Seventeen of the 21 Ph.D. students are male; 4 female. Both the M.S. students are male. Fifteen of the students are white and 8 are Asian; 16 are domestic and 7 international. The overall number of graduate students in the program has been declining in the past 10 years to half of what it was in 1995. This is particularly true for doctoral students. Some of the decline may be due to difficulties international applicants have faced since 9/11. However, it appears that much of the decline in student population can be attributed to the decline of female students. The current percentage of women graduate students in the Department is significantly lower than that in the University as a whole. This is unfortunate and somewhat unusual in the biological sciences. The relatively small number of female faculty may have been a reason for the low female enrollment in recent years. Two women faculty were hired recently, and it is to be hoped that this will help to reverse the trend.

Some questions by external members of the Review Committee were directed toward recruitment issues, trying to identify features that attract the students to the Department. The majority of the current students appeared to be independent thinkers and self-motivated. When they came to OSU on their recruitment visits they were impressed with the quality of the faculty, the broad opportunities for research including strong research facilities, the availability of biophysics with biochemistry, and the friendly environment. This information may be useful in developing recruitment strategies. The graduate students expressed interest in becoming more involved with the Department. They were enthusiastic, thoughtful, and made several suggestions about how they could contribute more to the Department. It is recommended that the Department make use of its current graduate students in recruitment and other departmental activities. For example, they could advise and assist more in recruiting future graduate students by helping with items such as web page design and by undertaking speaking engagements. They could take more of a lead in organizing seminar series and in developing a journal club.

It is recommended that the Department should study the reasons for the drop in the number of women students and take appropriate remedial actions. Also strong actions must be taken to actively encourage and recruit Hispanics and African Americans. The undergraduate population at OSU is an obvious recruitment pool, but the faculty might also network with other undergraduate institutions and encourage their students of all races and genders to apply to OSU.

It would be helpful if the Department were to determine why students apply to their program, why students decline admittance offers and from which colleges the students originate. The current graduate students are helpful, in so far as they are able to identify features which convinced them to enter the program. It is recommended that a formal or informal survey of students who decline admittance offers be carried out. These applicants could be asked about specific reasons for their decision not to come to OSU including assistantship stipends, required coursework, and the match between their research interests and faculty in the department. It is
also recommended that the Department needs to seek further advice through a recruitment consultant to identify the best methods for determining what works and what doesn’t work well in recruitment. For example, the Department has set up a program to support faculty presentations on other campuses, but have data been collected to determine if this recruitment technique is cost-effective? One idea, which was mentioned during the Graduate Program Review, was to have the Department participate in an umbrella, multidisciplinary graduate program. This type of approach often saves money and time, in terms of faculty participation, but usually condemns weaker departments to even fewer graduate students. Before the Department embarks on this approach as a means to increase graduate student quantity and quality, the Department should actively seek out the experiences of faculty at other universities that have embraced this approach. An alternative is to enhance the attractiveness of the Master’s Program and actively recruit promising Master’s students into the Ph.D. program.

In addition to expressing interest in more involvement with Department recruiting and formal department activities, there was interest expressed by the students to be more connected to the other graduate students in the program. They suggested pizza lunches and informal social gatherings. It is recommended that the faculty develop a variety of opportunities at which students may interact across the Department with fellow students and department faculty.

Selectivity of Students
The Department’s enrolled domestic students’ average GPA increased since 2000. The 2000 average of 3.36 is slightly lower than the average GPAs of enrolled domestic students between 1994 and 1999. The Department expressed concern that the GPA of their enrolled domestic students is less than the GPA of the domestic applicants. This has been a relatively recent trend and the difference may not be significant. Since these numbers usually have significant variance being based on small samples, we should not read too much into them. Average verbal and quantitative GRE’s for incoming students are higher than the average for all of the life-sciences students taking the exam and are comparable to those of students from the physical sciences. Thus students applying to, accepted to, and enrolled in the BB graduate program are in the top half of target students who have taken the GRE exams.

The Department considers several criteria including the GPAs and GRE scores of students in making admissions decisions. The total number of applicants to the Ph.D. program is around 180. The number of domestic students has dropped from about 30 in the early 1990s to about 15-20 per year currently. The total number of offers made is around 13 per year, while about 6 students enroll per year. About 50% of the domestic applicants were accepted into the program while only 2.5% of the foreign applicants were. Thirty-eight percent of the domestic students and 74% of the foreign students who received offers enrolled in the program.

The Department has changed the strategy of recruiting students from traditional means such as advertising in the Peterson guide to improving the web site. More recently the faculty are being encouraged and supported to go to conferences and other schools to advertise their graduate program. The students who are offered support are called for a campus visit and get a chance to visit with the faculty and students. Many of the students we talked to were impressed with the faculty and their research when they first visited here and were pleasantly surprised by the
Department’s strengths. While many students came to OSU due to personal and geographical reasons, some were attracted by the reputation and research of particular faculty members. Many students are attracted by the financial support; the Linus Pauling Institute and other multidisciplinary opportunities; and the Department’s laboratories and other facilities. While some are particularly attracted by the biophysics and biochemistry combination, we were told by the students that some students are turned off by the biophysics component and choose not to come here.

It was noted in the self study/by the Department faculty that the Department’s undergraduates often have higher cumulative GPA’s then the Department’s new graduate students. It is **recommended** that the Department consider whether recruiting from their undergraduates might be an option that should be more actively pursued.

One potential deterrent from recruiting better graduate students and more women may be the name of the Department. The word "biophysics" connotes extra rigor in the curriculum. Whereas the history of the Department is rich in strong biophysical research and this title may have been an advantage in the past, biophysics only represents about 30% of the current make-up of the Department and is somewhat misleading. Thus, the other 70% of the Department may be at a disadvantage when trying to recruit students for molecular biology or for mammalian research. Whether or not the title of the Department is an advantage or a disadvantage can only be decided by systematic data collection and marketing strategies, which the Department should establish. It is **recommended** that the Department begin to systematically collect data that would enable the Department to explore whether the use of the word “biophysics” in the Department title promotes or deters the recruitment of graduate students.

**Financial Support of Students**
All the first year students are offered GTAs at the rate of $19,000 for 12 months. During 2004-2005, the students paid fees of several thousand dollars per year. Some students were surprised by this additional fee and health care costs and were not prepared for it. In the future, there should be a clearer communication from the Department and the university about the additional fees, before the students make their decisions. The Department will be raising the GTAs to $20,500 starting 2005-06, which would alleviate some of the problem. It will be much better if they eliminate the additional fees instead or bring the stipend closer to the same level as the other schools. From the second year on, the funding depends on the availability of research grants with individual faculty members and good academic standing of the student. It is **recommended** that students be made aware of the dollar amount of student fees when they are sent information about their admittance into the program and the offer of a GTA position.

**Curriculum**
The graduate school requires a total 115 credits for a Ph.D. degree. The Department requires a total or 36 real (non-blanket numbered) course credits, including a 3-course core sequence in Biophysics and a 3-course core sequence in Biochemistry. The rest of the courses can be special topics courses of which there are many or other courses in related departments.
A typical graduate student program consists of taking core courses, finding a major professor, and forming the program committee during the first year. All first year students must take the first year graduate seminar series, which gives an opportunity for them to learn to present their work. The Department also sponsors seminars every week, a majority of which are by faculty members from other institutions. There are other seminars offered by various departments and programs that the students are encouraged to attend.

Every first year graduate student is expected to do at 3 lab rotations, one per term. During the first quarter of each year, all of the faculty members of the Department make 30-minute presentations to the students to introduce them to their research, which can be the basis of choosing rotations. The research rotations expose the students to the variety of opportunities available in the Department. Secondly, they help the student “try out” a lab and the professor to “try out” a student. At the end of each rotation, the faculty member is expected to complete an evaluation and allow the student to add his or her own comments. These are used to evaluate the student at the end of the year. In addition, the student will be presenting a summary of his research to all faculty in a 5 minutes presentation at the end of each rotation. From the students we talked to, it appears that most students find a major professor to work in within 3 rotations, although there are occasionally some who cannot. The end-of-the year evaluation gives a chance to determine the reasons and terminate weak students. The students we talked to were generally happy and satisfied with the system.

In third year of their Ph.D. the students are required to present a seminar on their research to all faculty members. This usually occurs before the prelims and may help students progress towards their prelims in a timely manner. The prelim includes a proposal preparation, presenting it to the committee and answering questions on the proposal and course preparation.

Whether the faculty agrees philosophically or not, the trend in science graduate programs is to reduce the core course requirements to a maximum of three, to have some type of requirement for advancement to candidacy by the end of the first year, and to allow the students to focus on research projects from their second year onward. Many programs do continue to require and provide student participation in seminars and/or journal clubs.

*It is recommended* that the faculty re-evaluate whether they are doing the students a service or disservice by imposing too many extra requirements, including six core courses, on their graduate students. Although, there was no opportunity to query students who declined admission to the Biochemistry and Biophysics Graduate Program, one can only guess that the heavy requirements, in comparison to other comparable graduate programs, may be a deterrent. During the re-evaluation *it is recommended* that the Department consider revamping its core requirements.

**Scholarly Community**

The Biophysics and Biochemistry Department has 15 tenure track faculty including 8 full professors, 4 associate professors, and 3 assistant professors. In addition there are 17 affiliate faculty that reach across biological and chemical departments and institutes at OSU. This department is small in relationship to other departments of biochemistry across the country.
Recent hires of two female faculty have made the demographics similar to those of other biochemistry departments. Salary ranges for full and associate professors are lower than the national averages, but rates for assistant professors are close to the average. Thus the Department can be reasonably competitive in recruiting for junior faculty positions.

The Department is very conscious of its multi-disciplinary role and participates in multi-departmental programs in Biology, Genetics, Toxicology, and Molecular and Cell Biology. Several of the faculty members actively contribute to Linus Pauling Institute (LPI), Environmental Health Sciences Center (EHSC), and Center for Gene Research and Biotechnology (CGRB).

The Department’s strengths include X-ray crystallography, kinetic, optical, and NMR spectroscopy to study the structure, folding, and modification of proteins and nucleic acids. Joining hands with LPI, the Department has established strengths in the areas of oxidative stress and aging. In recruitments over the last six years, the Department has maintained its balance in the biochemistry and biophysics research areas but has significantly increased the number of faculty in the mammalian molecular and cell biology by adding three assistant professors. There may be changes in the coming years as the Department is planning to align itself with the provost’s initiative to recruit people in bioinformatics and systems biology and join the capital initiative to recruit top faculty.

Collaborating with several other departments on the campus and the EHSC, the Department is developing a fully functional transgenic mouse facility for doing research into mammalian development and human disease. In the past, several faculty have played key roles in establishing multidisciplinary programs and centers on campus, including the Center for Gene Research and Biotechnology (CGRB) and the Molecular and Cellular Biology Program.

The average teaching responsibility for faculty is 2.6 courses for the academic year, with one course on average being a graduate-level special topics class. This is equivalent to 75 students per FTE per term. New faculty in the Department are given reduced teaching loads of in-class teaching, which gradually increases to the normal level in 3 years. Although this teaching load is relatively low compared to other departments in the college, it is very high compared to other departments of biochemistry, especially those in medical schools. This inevitably impacts on the time available for faculty to pursue research, and supervise graduate students. Although several faculty could probably do so, it is not department policy to allow faculty members to entirely buy-off from their teaching responsibilities.

Facilities
The faculty’s success in obtaining grants has translated into the acquisition of a variety of instruments and the development of the facilities to further the faculty’s research capabilities. This includes a 600 MHz NMR/Micrococoil, an X-ray Facility shared with Chemistry, a Confocal Microscope, Rapid Kinetics, FTIR, Plasmon Resonance Spectroscopy, BioCAD perfusion chromatography, Yeast Knock-out and Antibody Display Library, a student computer lab, and a stereographics classroom. The total funding awarded for equipment and facilities in the past 10 years is $3,193,000.
The Department of Biochemistry and Biophysics is located in the Agriculture and Life Sciences Building. Much of the space for research laboratories, offices, shared research facilities, and the Department office is on the 2nd floor. There is additional space on the second floor allocated to the EHSC and CGRB for shared instrument facilities (including the biological X-ray diffraction and Confocal Microscopy facilities). The laboratories and offices of Drs. Frei and Hagen are located in the space assigned to the Linus Pauling Institute on the fifth floor of Weniger Hall. There is storage space and plant growth chambers in the basement of ALS and storage space on the 6th floor of Weniger Hall. The utilization of space in the basement is being renegotiated in order to develop a transgenic mouse facility to serve the life sciences unit, colleges, and centers on campus. Additional facilities include preparation and cold-rooms; Department classroom; a reading room holding current journals and periodicals, textbooks, assigned class material, job resources, and selected publications from various members of the faculty; conference room, graduate student/staff lounge.

Current attention to facilities is to improve the animal facilities particularly in the area of developing a transgenic animal facility to study model organisms and their development. This need has been recognized across campus via support from the University, the College of Science, the Linus Pauling Institute, and the Environmental health Sciences Center.

**Administration**

The Department is located in the College of Science. The Department chose to be located within the college because of the mission of the College emphasizing teaching, training and basic research. Expectations for research and instruction are well defined. Additionally, a department that is located within one college has a lower administrative overhead compared with departments located within two or more colleges.

The Department Chair is currently appointed on a 5 year rotating basis by the Dean of the College with recommendations from the Department faculty. The current Chair, P. Shing Ho, will be reviewed during Spring 2005 and is expected to rotate out of the position at the end of the 2006-2007 academic year. The Chair’s responsibilities include budgetary oversight, enforcement of department policies, regular review of Academic Faculty, assignment of teaching and service responsibilities, and oversight of the department staff.

The Department has four standing committees. These are: Executive Committee, Curriculum Committee, Graduate Committee, and Promotion and Tenure Committee. The Graduate Committee is composed of four Faculty members appointed by the Chair for staggered two-year terms. The Chair of the Graduate Committee is appointed by the Chair of the Department. The Graduate Committee evaluates applications and makes recommendations for admission to our graduate programs, oversees graduate student recruitment and administers the Departmental Exams.

There is a Graduate advisor appointed by the Chair for a three year term. The Graduate Advisor assists with orientation and advising of entering graduate students, monitors the academic progress of graduate students and oversees all aspects of the graduate program.
Support Staff
The support staff consists of an Office and Research Coordinator (at 0.5 FTE), one full time Office Specialist, and a full time Accounting Technician.

Performance of the Program
The Department has actively participated in several interdepartmental programs, including the Linus Pauling Institute, the Environmental Health Science Center, the Center for Gene Research and Biotechnology, and the Molecular and Cellular Biology Program. The interdisciplinary collaborations expand the strengths and research breadth of the Department, providing intellectual stimulation for faculty and students alike as well as providing additional recruitment and research funding opportunities.

Graduate Students and Graduate Program
The number of Ph.D. degrees conferred from 1995-2004 has held steady at 3.3 per year, peaking at 4 during the period 1999-2002, a Ph.D taking somewhere from 4 to 8 years, with an average of 5.4 years, where the norm for graduate programs in the country is between 5 to 5.5 years.

The Department currently has 23 graduate students (i.e., just less than two per active faculty member). It would be good to see this number expand in such a successful research department. About three to four graduate degrees are awarded each year, corresponding to the mean time to graduation of between five and six years. The alumni survey indicates that most students thought that this was about the length of time expected. Graduate students seemed satisfied with the quality of teaching that they received, but undergraduates raised some points of concern that should be addressed in relation to all types of teaching undertaken by the faculty. Alumni expressed a good deal of satisfaction at the quality and relevance of the training they had received in the Department.

Eleven students interacted with the graduate program review committee. While some students felt that communications with faculty were very good, the majority thought that there could be improvements – this disparity probably reflected the working relationships with major professors. We recommend that one or more regular methods for improving intra-departmental communications is developed.

One concern expressed by the graduate students was the design of the doctoral preliminary examinations. They felt the process evaluated a student’s ability to take a test more than it evaluated the subject matter content of the exam. Prior to their oral Preliminary Exam, the graduate students are required to pass a series of departmental written exams in their second and third years. This series of exams is composed of a set of two questions given each term. Students must pass six questions out of a maximum of 12 questions. The students stated that the topic of the questions is made available a few days prior to the exam. Students felt that the exams did not help them learn anything new or synthesize currently held knowledge. Although this type of examination system is intended to provide an in-depth education in a broad range of topics germane to biochemistry and biophysics, there is no indication that the process achieves this well-intentioned goal.
It is recommended that the Department review their preliminary doctoral examinations. A first step to take is to discuss what outcomes the Department wishes to achieve with the preliminary examinations. For example, one outcome might be the goal to encourage students to think creatively rather than the memorization of facts. They may wish to contact other programs to learn about the various written preliminary examination designs that are currently being used on the O.S.U. campus. Depending upon what outcomes the Department wishes its doctoral candidates to have, the Department may want to consider changing the format.

The students were divided about whether the balance of coursework between biochemistry and biophysics was reasonable, though a number expressed the view that it was the availability of both that had been an attraction. The scheme by which students rotate through different laboratories was popular and seems to work well without being too formalized. Students liked the opportunity of working one-on-one with faculty. Students reported that they had good opportunities to attend professional meetings, and they regarded this as very important for their career development.

Students did recommend a class on grantsmanship and a technical writing course. These topics might be included as part of the preliminary examination process as is done by several OSU departments. One student recommended a three term bio-analytical methods course. They also suggested that prospective students be informed of student fees when they were offered their assistantships as these costs were unexpected.

Results from a survey of graduate PhD alumni indicated that they felt ‘satisfied’ to ‘very satisfied’ with their overall experience in the Department. There was particular satisfaction with the advising from major professors and general satisfaction with the overall graduate program. Fifteen of the sixteen respondents stated they would select the same major, degree, and O.S.U. again if they were starting their degree program. When asked about how prepared they were as a result of their training at OSU nine of the 16 students surveyed felt very prepared as a result of their training, and five were somewhat prepared. Several of the respondents made additional positive comments about their graduate degree program: “very satisfied with the level of training and mentorship that I received,” “The BB program at OSU has turned out to be one of the best times of my life,” and “Since leaving it has become clear to me that understanding of Biophysics is critical to Biochemistry.”

The lowest levels of satisfaction were awarded for the advising from the Department (as opposed to generally high satisfaction with the major professor), the diversity and availability of graduate classes, level of financial support, and relationship with the graduate committee.

While the Department does not actively recruit nor guarantee financial support for M.S. students they received 5 responses from alumni who had earned their M.S. from the Department from 1993 to 1998. In general the graduates were satisfied with their education experience in the Department. They were particularly satisfied with the overall quality of graduate education, the diversity and availability of graduate courses, and the resources for student research. There was
less satisfaction with advising/guidance and major professor mentoring. Four of the five felt very prepared for a career or move to more advanced degree.

One master’s degree alum, however, seems to have had an unfortunate experience. He wrote, “I was restricted in my learning by a professor whose lab did the analytical testing for my lab’s compounds. I wanted the lab experience; he wanted to be included in the on papers and refused to teach the techniques to anyone in our lab.” This was a comment from only one individual; however, it may suggest a possible area for improvement. **It is recommended** that the Department review its policies regarding similar situations to ensure that policy is in place that makes the expectations for the professors and students very clear.

Faculty
In general, the faculty compare favorably with similar departments in other established research universities. The national and international stature of several senior members is outstanding. In terms of objective measures of faculty quality, the faculty in the Department of Biochemistry and Biophysics rank 36 out of 194 departments in the 1995 National Research Council ranking of graduate programs, comparable in rank to the University of Minnesota and the University of Southern California. A more recent survey, reflecting the retirements as well as the research programs of the newer faculty is not available. However, other indications of quality include the amount of external research support and the publication activity. The extramural research support is outstanding for a moderate size department in biological sciences, given the average $358,000 in support per faculty per year in the most recent five-year period. The publication activity is also good, given the annual average of 2.4 peer-reviewed research publications per faculty in the 2000-2004 period. As faculty retirements and an increased number of service teaching classes have taken their toll, research income per faculty member has fallen. The average annual publications drops to 1.3, if one excludes those retired or LPI faculty without teaching responsibilities, suggesting a significant impact of teaching duties upon research activities.

Overall, the faculty is highly successful in the research enterprise and manages this with a teaching load that is considerably larger than in other biochemistry departments. The Department teaches a large number of service courses at the undergraduate and graduate levels. This imposes a large load on the faculty, and it is not clear that they receive sufficient support in terms of GTAs from the college and from major ‘customer’ departments. It is difficult to see that the Department’s three goals of improving its national standing as a research program, maintaining the quality of undergraduate student programs, and expanding the graduate program can all be achieved with the current resources.

By several criteria, biochemistry and biophysics is one of the most successful academic research units on campus. Currently the Department’s success is reflected in the success of the faculty in competing for external funding for its research and instructional activities, as well as in national recognition of individual faculty in research and in instruction. In 2003-2004, 100% of the academic faculty had some form of external funding for their research. Over the past five years, $28.5 million in direct funds towards faculty research have been achieved by the Department. This translates to an average of $5.2 million per year to directly support these research efforts.
For comparison, the average from 2001-2004 generated by all departments in the College of Science was $17.1 million. Members of the faculty have been recognized for the research accomplishments at many levels. For example the Department had three of its first eight faculty members named as OSU distinguished Professors. Several faculty members have received national awards including the Eli Lilly Award from the American Chemical Society, the N.I. H. James Shannon Director’s Award and the N.I.H. Merit Award. Several members of the faculty hold editorial positions, participate in and chair national meetings and review panels, and have received faculty development awards for teaching.

The faculty has also been very successful in winning funds to improve undergraduate and graduate instruction. For example, major funding from the Howard Hughes Medical Institute permitted the development of new laboratory courses in molecular biology research techniques and has also supported innovations elsewhere on campus in a related biological teaching. Additional funding has been achieved to establish a stereo graphic classroom for the visualization of molecular structures and enhancement of computer laboratory resources.

While there is certainly much to celebrate here, it is worth noting that the faculty members who are most famous and brought a lot of recognition to the Department are quite senior or retired already. The Department has a strategic plan to increase the size and stature of the faculty and become one of the top 10 programs in Biochemistry in the western United States by 2015. The fulfillment of this vision depends a lot on how vigorously it can follow through with its plan of filling its positions with top-notch faculty and continuing its tradition of high quality research. If it is the desire of the Department and the College of Science that the Department of Biochemistry and biophysics retain and improve its national standing related to grant funding and research activities it is recommended that additional faculty positions (1 or more) be enabled for the Department.

In its strategic plan, the Department clearly recognizes the difficult task of maintaining and possibly enhancing its quality in view of declining state budgets. The plan to increase the number of faculty by 20% by requesting academic salaries on new extramural proposals is excellent and appears to have the support of the College of Science administration. Although the Department is unlikely to obtain new FTE positions using formulas tied to undergraduate teaching loads, the Department must leverage new FTE positions through joint appointments with other departments. The Department is somewhat engaged in such activities via the Computational Biology and Bioinformatics Initiative as well as through the Environmental Health Science Center. However, the Department seems to have missed other opportunities. For example, the Physics Department recently hired a considerable number of new FTEs. Biophysics is an emerging research area in Physics Departments throughout the country. There may have been an opportunity for the Department to strengthen its biophysics research program by possibly interesting the Physics Department in some area of biophysics that would also complement the research interests in their own Department. It is recommended that the Biochemistry and Biophysics Department take advantage of every possible opportunity for new hires, be it in their own department, the collaborative interdisciplinary programs in which they participate, or in any other department within the College of Science.
The Department has reasonable plans to direct scholarly growth in certain targeted areas, such as in mass spectrometry and computational biology, although many universities have already hired in these areas. Since the department is relatively small and major changes in the number of faculty will probably not occur in the next five to 10 years, it is recommended that in addition to targeted expertise, the Department should also consider focusing on a few programmatic areas, such as they are already doing with oxidative stress. Other programmatic areas could be related to a specific environmental problem in which x-ray diffraction, NMR, environmental biochemistry, mammalian genetics, or other tools can all be applied to the same topic. Funding institutions are definitely favoring the application of many types of tools to a specific important target area. Funding agencies are passing up the opportunities to support groups of people using one type of tool, wherein the applications are totally unrelated. If wisely chosen to complement the present research interests of departmental faculty, shared programmatic areas offer significant collaborative opportunities for faculty to address research problems with a broad array of techniques, including mammalian genetics, biophysics, molecular biology, and biochemistry. A thematic focus, employing interdisciplinary strategies, appears to be favored among the extramural funding agencies and offers the potential for the Department to develop a stellar national reputation in a few select research areas.

Adequacy of the Infrastructure
Facilities
Students, alumni, and outside reviewers all commented on the strong facilities, modern lab equipment and the number of state-of-the art instruments. The faculty members’ success with grant awards is responsible for some of the equipment that has been added in the last 10 years. More than $3M was generated in the last 10 years to buy sophisticated research equipment including a 600 MHz NMR/Micrococoil, an X-ray Facility shared with Chemistry, a Confocal Microscope, Rapid Kinetics, FTIR, Plasmon Resonance Spectroscopy, BioCAD perfusion chromatography, Yeast Knock-out and Antibody Display Library, a student computer lab, and a stereographics classroom. Almost all of this equipment included a match from OSU.

Administration and Department Governance
The Department appears to have made a successful transition from a long-term chair with a significant international reputation to a younger, energetic chair in mid-career. Presumably, the 10-year strategic plan for the Department reflects the vision of the present chair.

The departmental governance is very democratic and follows well-specified bylaws, procedures, and policies. The chair of the Department is reviewed every 3 years by the entire Department. There is an executive committee that helps the chair in executive matters, a graduate admissions committee that helps in admissions, a curriculum committee that monitors the curriculum changes, a promotion and tenure committee that evaluates junior faculty and makes recommendations on promotion and tenure. Most departmental decisions are made by voting and consensus by the academic faculty. There is a graduate advisor and an undergraduate advisor.

There appears to be a major disconnect between Dean Bloomer’s vision and the Department’s own perception of itself and their vision for the future. Given the Dean’s need to take a big
picture view and the Department’s need to stay focused on the Department, this is not entirely surprising. The Department sees itself as a nationally ranked Biochemistry and Biophysics research group and is planning to stay in that elite company. The Dean appears to view that the national rankings are not as important as being known for something. He seems to think that if the department decides on a small number of signature areas of concentration and builds strengths in those areas, he would be willing to support them. There is goodwill on both sides to take the department to the next level, but there also appears to be much listening to do on both sides. We hope that this report will help initiate a discussion on where the department should be heading and how. The Dean and the Chair need to agree on what criteria will be used to judge the Department’s success or failures.

The Quality of the Outcomes

Professional Viability of Graduates
The students appear to receive good guidance and help in finding suitable post-doctoral positions as well as industrial opportunities. The survival guide the Department put together gives a lot of useful advice on where and how to find employment as well as other tidbits on how to survive the graduate school.

Initial positions held by graduates of the Department’s graduate program include Postdoc, Harvard Medical School, Department of Biological Chemistry and Molecular Pharmacology; Postdoctoral research appointment at the National Institute of Health; Staff scientist at a national cancer center; NIH postdoctoral fellowship studying in the Department of Biochemistry at the University of Leicester; and Postdoctoral position at Beth Israel Deaconness Hospital.

National Program Rankings/Ratings
The 1995 survey of American Ph.D. programs conducted by the National Research Council ranked OSU in the top twenty percent of graduate programs in Biochemistry and Molecular Biology (36 out of 194). While a new survey has not yet been completed, the Department stated in their self study that “Maintenance of our position has occurred despite steady erosion of University resources.”

There appears to be an over-emphasis on the national rank of the Department. Not only is it difficult to obtain a reliable rank, but the significance of the rank, save for the very top departments, remains obscure. The 2002 US News and World Report Survey ranked the Biological Science program as 75th of 138, but did not rank the individual disciplines, such as biochemistry or biophysics. The National Doctoral Program Survey did not grade or rank the Department of Biochemistry and Biophysics at OSU from a graduate student’s perspective because only one student returned the questionnaire. Except for an external review, the noteworthy rank of the Department does not appear to be used for any purpose, such as faculty or student recruitment, as the rank is not mentioned on the departmental web site. Thus, emphasis on improving the national ranking of the Department in the strategic plan is without merit unless the Department has specific plans to use the rank in some way.
The National Research Council rankings are ten years old. The Department needs to rely less on these rankings as a tool to judge the stature of the Department. It is recommended that the Department find other metrics (funding per faculty, papers per faculty, research impact, quality of undergraduate and graduate students, and so forth) to use as a more frequent measure of the Department’s national stature. This decision needs to be consistent with the means by which the Department is evaluated by the Dean and the University.

In summary, the external review committee met with faculty and students in the Department. The faculty and staff and their programs make a substantial contribution to research and teaching at OSU; the prospect for future contribution is great.
The faculty in the Department of Biochemistry and Biophysics would like to thank the Review Committee for its work in evaluating its Graduate Program and for preparing a well-balanced report on the Program. The tone of the report suggests that this is a strong program, with a very high degree of student satisfaction, and we take many of the recommendations made in the report as suggestions towards "fine-tuning" the program, rather than as needs for complete revamping of the program.

Our responses to the recommendations in the report are as follows.

**It is recommended that** the Department make use of its current graduate students in recruitment activities and other department activities. For example, they could advise and assist more in recruiting future graduate students by helping with items such as web page design and by undertaking speaking engagements. They could take more of a lead in organizing seminar series and in developing a journal club.

**Response: The Department currently makes use of its graduate students for the following functions in recruitment:**

1) Hosting visiting students
2) Recommendations for what students are most concerned with in recruitment
3) (Just started) presenting seminars and information sessions at undergraduate institutions

**In terms of seminars and a Journal Club:**

1) Graduate students already have the responsibility of inviting and hosting one seminar speaker each year (this year, it was John Fenn, Nobel Laureate in Chemistry)
2) There was, up until 3 years ago, a BB graduate student run journal club that died due to lack of student interest. The Department will continue to encourage and support such efforts, with a faculty member as lead.

**It is recommended that** the Department should study the reasons for the drop in the number of women students and take appropriate remedial actions. Also strong actions must be taken to actively encourage and recruit Hispanics and African Americans. The undergraduate population at OSU is an obvious recruitment pool, but the faculty might also network with other undergraduate institutions and encourage their students of all races and genders to apply to OSU.

**Response: The Department has identified the issue of declining enrollment of women in our graduate program as a problem and has attempted to address this issue. We believe that this problem has arisen primarily from under-representation of female mentors on the faculty and the lean of the Department towards Biophysics in the past few years. Our recent hires have included more women (2 out of 4 hires in past 5 years were women, thus tripling the representation in the faculty) and in areas that are more biological (one cellular biologist and 2 developmental biologist), and we believe that these efforts will start to reverse this trend.**
That being said, it is interesting that many of the female graduate students have or are pursuing their degrees in areas of Biophysics.

It is recommended that a formal or informal survey of students who decline admittance offers needs to be carried out. These applicants could be asked about specific reasons for their decision not to come to OSU including assistantship stipends, required coursework, and the match between their research interests and faculty in the department.

Response: The Department had initiated several years ago informal interviews with applicants who declined our offers of acceptance, as suggested. One of the primary reasons for applicants accepting offers elsewhere were related to the lack of an adequate healthcare program, and was the impetus for this Department taking a lead in trying to devise a plan for providing healthcare for Graduate Students. The healthcare issue is no longer a significant factor. The results from interviews of applicants from the past two years (since the current policy on healthcare for graduate students was established) have been too sparse to determine any trends.

Some recent responses include the following:

"UGA is expanding its biochemistry program. They recently brought in a number of new faculty, many of which have only a few graduate students (if any), yet have a substantial amount of money to spend on research. Furthermore, these new positions offer exiting frontiers in areas no other researcher is looking into (yet). A few of the faculty guaranteed a paper within the first year or year and a half. They also have just erected a new building called the complex carbohydrate research center, which also has a lot of room for more faculty and expansion. Furthermore, UGA has the largest NMR center in the nation.

Less importantly, Athens, GA is a lot like Madison in regards to the variety of things to do. It is 60 miles from Atlanta, a few hours from the Atlantic, and 45 minutes from the Appalachians. Like OSU, it offers a plethora of outdoor activities and the weather is better than in Wisconsin. It offers a slightly smaller stipend ($18,500) than OSU, but since many of the faculty are looking for graduate students, this figure is debatable (I think you mentioned something like that when I was there, but that may have been UNC as well). Also, the southeast is cheaper than other parts of the nation.

The faculty was more concerned with me joining their own lab than in going to their school and thinking about rotating with them. So, the approach was a little different than what I was used to.

I hope this helps to rationalize my choice, and aids in your own future recruitment."

"I am writing to let you know that I will not be accepting your offer of admission. I am going to be attending at USC in their Molecular and Computational Biology department. This had been a very difficult decision but one we feel comfortable with. Thank you so much for your time and hospitality!" (from a student who completed a degree from OSU)
"BB program at OSU is great. In fact it was tough for me to decide between the options I had. The only reason where OSU scored a negative point is health insurance. If OSU had provided for my health insurance, I would certainly have opted for BB program at OSU."

"I wanted to let you know that I have decided not to attend OSU for my graduate work. I take no pleasure in writing this letter, but I did want to let you know that this decision was an extremely difficult one and I am glad I only need to make it once. OSU has an excellent program and wonderful scenery to boot and I was very flattered by your offer. Thank you for allowing me to come visit OSU and speak with the professors."

"Unfortunately I cannot attend OSU due to personal reasons, which I think you know of, and so I will have to remain in Southern California. I appreciate all that you did for me during the interview and outside the interview. You have a great campus with great research and the Linus Pauling Center is amazing."

It is also recommended that the Department needs to seek further advice through a recruitment consultant to identify best methods for determining what works and what doesn't work well in recruitment.

Response: We may pursue this, but our ability to do so will depend on the available resources. Such an effort may be best done at the College level, since this is not the only Department in the College of Science to face such issues in graduate recruitment.

It is recommended that the Department consider whether recruiting from their undergraduates might be an option that should be more actively pursued.

Response: We, as most graduate programs in biochemistry across the country feel, do not believe that it is in the best interest of the STUDENT to encourage them to stay at OSU to continue their graduate work (with the exception of MS students). We consider each case individually, and no longer deny students admission to the program based solely on having an undergraduate degree from OSU. However, we continue to believe that it is in the best interest of the student to pursue their advanced degree elsewhere in order to provide a broader perspective and training in the fields of biochemistry and biophysics.

It is recommended that the faculty develop a variety of opportunities at which students may interact across the Department with fellow students and department faculty.

Response: The Department currently holds a picnic in early Fall to introduce incoming students with current students (this is run by the second year Graduate students) and a Department-wide softball game at the end of Spring term. We will continue to encourage the reestablishment of a journal club and a Graduate Association.

It is recommended that the Department begin to systematically collect data that would enable the Department to explore whether the use of the word "biophysics" in the Department title promotes or deters the recruitment of graduate students.
Response: We do not believe that a Department should change its name just for the sake of recruitment. It is the Department's opinion that such a change must come from a fundamental realignment of the Department's mission to NOT have a focus in biophysics before making such a name change. In doing so, however, we believe the Department will lose its unique character.

It is recommended that students be made aware of the dollar amount of student fees when they are sent information about their admittance into the program and the offer of a GT A position.

Response: Up until last year, the per term fees were spelled out in the letter of offer to students. This year, we have raised stipends to $21,000 and have offered $500 during the first term to cover the "matriculation fee" imposed by the University. We will include all information concerning fees again in the letter of offer, as suggested. We should note that a much of the students fees are imposed by the students upon themselves and if the graduate students see no benefit to them, they should consider becoming involved in student governance to change them.

Several recommendations relate to the need for the department to consider what outcomes it desires of its graduate programs. After determining what outcomes are desired and needed it is recommended that the Department consider revamping its core requirements, that the Department review the preliminary doctoral examinations, and that the department consider offering technical writing, bioanalytical methods, and grantsmanship courses.

Response: The 36 credit "real course" requirement is minimum requirement defined for a course of study towards a Ph.D. as defined by the Graduate Council at OSU (we note that there seems to be some flexibility now in this minimum, and will pursue this). Still, we must ask what this Department wants to be in a very fundamental way before we start tinkering with the curriculum. The degree of satisfaction of our graduates (and, anecdotally, from their employers after graduating from OSU) suggests that the current course of study works very well for what it was intended to do.

A course on bioanalytical techniques (Biophysical Methods) is offered in the Department every year by Prof. Sonia Anderson. Many of our graduate courses use grant proposal writing as a means of evaluating student performance.

Graduate Student and Faculty Interaction

It is recommended that methods for improving intra-departmental communications be developed. As a corollary to this it is recommended that the Department review its policies regarding graduate students' lab experiences and that these policies are clear to both faculty and graduate students.

Response: We will again encourage the Graduate Students in the Department to reestablish a Graduate Association. As the Chair had indicated to the Committee during the exit interview, this Association, in its prior incarnation, allowed formal student-faculty communication on
procedures, grievances, and other matters. The Association had dissolved itself over conflicts concerning the establishment of a Graduate Student Union on campus. The Department will provide the incentives needed for the students to reestablish this group.

Faculty and Faculty Performance

If it is the desire of the Department and the College of Science that the Department of Biochemistry and Biophysics retain and improve its national standing related to grant funding and research activities it is recommended that additional faculty positions (1 or more) be enabled for the Department.

Response: We cannot agree more! We are attempting to add new members to the faculty through the Provost Initiative in Computational Biology, and in coordinating efforts with the Environmental Health Sciences Center and the Linus Pauling Institute, among others.

It is recommended that the Biochemistry and Biophysics Department take advantage of every possible opportunity for new hires, be it in their own department, the collaborative interdisciplinary programs in which they participate, or in any other department within the College of Science.

Response: We will continue to participate in all faculty recruitment efforts, including those that are outside the Department, when we are invited to. We had previously participated in recruitments in Chemistry and Zoology. The current Chair had a number of conversations with the Chair of Physics concerning their recent recruitment efforts, with the discussions centering on what areas in biophysics have seen significant contributions from Physics Departments at other Institutions, and how various Centers and units (including ours) across the OSU campus could help in their efforts to develop competitive startup packages and to provide adequate space and facilities. Unfortunately, we were not invited to participate in these recruitments, suggesting that the Physics Department made a decision that biophysics was NOT an area of interest for them.

It is recommended that in addition to targeted expertise, the Department should also consider focusing on a few programmatic areas, such as they are already doing with oxidative stress.

Response: We have done this with oxidative stress (historically, has been a strength), and are doing this in structural biology, including the submission of an NIH Roadmap Grant Proposal to develop a Center to study macromolecular structure and dynamics by mass spectrometry. It should be noted, however, that such areas of programmatic strength are best served across departments. For example, there is a developing strength in the area of nucleic acid structure (in RNA and DNA), but this is through collaboration between Biochemistry and Biophysics and the Department of Botany and Plant Pathology. The strength in oxidative stress is continuing to be fostered through associations with the EHSC and LPI. It would be difficult (and risky) to build a sufficiently large group within a single department in the life sciences at
OSU (because of the nature of the Departmental and College structure) to develop a single area of expertise in any individual department.

Quality of Outcomes

It is recommended that the Department find other metrics (funding per faculty, papers per faculty, research impact, quality of undergraduate and graduate students, and so forth) to use as a more frequent measure of the department's national stature. This decision needs to be consistent with the means by which the Department is evaluated by the Dean and the University.

Response: The use of national ranking of the program in defining its stature, especially in defining the goals of the Strategic Plan, was, in fact, based on the metrics used by the College and University in defining their own goals. We note, for example, that the stated goal of the University is to become one of the top 10 Land Grant Universities in the country. The goal of the College of Engineering is to become one of the top 10 Engineering Programs in the country. These are goals that the community (within and outside of OSU) can understand and, therefore, can support. In the strategic plan, there are specific goals for certain areas, including oxidative stress, structural biology, and molecular and cellular biology, and these are all coordinated to reaching an overall goal. Such metrics as funding and papers per faculty become part of the national ranking. The recommendation from the report that we should use these metrics in graduate recruiting is well taken.
APPENDIX C

From Molecules to Mice: A Strategic Plan for Development and Growth in
The Department of Biochemistry and Biophysics at Oregon State University

I. Goals and objective

The goal of the Department of Biochemistry and Biophysics at Oregon State University for the next ten years is to become recognized as one of the top ten programs in Biochemistry and Biophysics in the Western United States according to the National Research Council or NRC rankings. The incremental objectives and incremental steps to achieve this goal are stated below.

A. Objectives:
   1) (Years 1-5) Recognized as one of the top 10 programs on the West Coast (west of the Rocky Mountains), and
   2) (Years 5-10) Recognized as one of the top 10 programs in the Western United State (west of the Mississippi River).

B. Steps towards these objectives for the next 10 years (2005-2015):
   1) Increase faculty size by at least 20% by adding 3 or more new faculty members.
   2) Increase overall external funding that supports faculty research programs
   3) Add at least 2 faculty members to the National Academy of Sciences:
      a) Hiring at least one faculty member of national stature,  
      b) Elevate at least one current member of the faculty to the NAS.
   4) Increase number, quality, and diversity of applicants and matriculated students in the Graduate Program by:
      a) Establishing Graduate Fellowships to attract and support strong applicants,
      b) Outreach by faculty members and current graduate students to Colleges and Universities in the region and nationally,
      c) Establishing at least one training grant to support graduate students.
   5) Increase the number and quality of postdoctoral research associates.

All of these steps are interrelated. To attract highly qualified graduate students and postdoctoral associates, the Department must have a national reputation and strong individual faculty research programs. To attract quality faculty, the department must be attractive to high quality graduate students and postdoctoral associates. Thus, these incremental steps towards our objectives will be pursued in parallel. This strategic plan was drafted to define steps that can be taken by the Department to move towards each of these goals, with plans to fund new faculty hirings that take advantage of the Department's abilities to secure extramural funding for research and instruction, of initiatives presented by Centers on campus with strong ties to the department, and that ties the Department goals with those of the Capital Campaign at OSU. Although there is a recognition that improving graduate and postdoctoral associate recruitment and retention is important, the current Strategic Plan focuses primarily on improving the recognition of the Program through strategic growth in the Faculty, which are the primary factors in increasing its regional and national stature and are important for recruitment at all levels.
II. Department Standing

The Department of Biochemistry and Biophysics is currently ranked 39th out of 199 programs nationally according to the 1993 NRC survey, tied with the University of Minnesota and the University of Southern California. Among Biochemistry programs, the Department ranks 11th with USC on the West Coast (west of the Rocky Mountains) and 15th with the University of Minnesota and USC in the Western US (west of the Mississippi River). The programs that are currently ranked at and above OSU in these regions are shown on Table 1 along with their faculty sizes.

Table 1. 1993 NRC Ranking of Biochemistry Programs on the West Coast (west of the Rocky Mountains) and in the Western United States (west of the Mississippi River). The faculty size count includes tenured and tenure-track Assistant, Associate and Full Professors, and do not include Affiliate Appointments or non-tenure-track positions.

<table>
<thead>
<tr>
<th>Regional Rank</th>
<th>Region: West Coast</th>
<th>Region: Western United States</th>
<th>Faculty size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of California San Fransisco</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>Stanford University</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>University of California Berkeley</td>
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<td>32</td>
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<tr>
<td>4</td>
<td>California Institute of Technology</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>5</td>
<td>University of California San Diego</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>University of Colorado</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>Washington University</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>University of California Los Angeles</td>
<td></td>
<td>21</td>
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<tr>
<td>9</td>
<td>University of Washington</td>
<td></td>
<td>27</td>
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<tr>
<td>10</td>
<td>Baylor School Medicine</td>
<td></td>
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<tr>
<td>11</td>
<td>University of Texas Southwestern</td>
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<td>12</td>
<td>University of Oregon</td>
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<td>University of Utah</td>
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<td>University of California Davis</td>
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<td>15</td>
<td>University of Southern California</td>
<td></td>
<td>24</td>
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<tr>
<td>15</td>
<td>Oregon State University</td>
<td></td>
<td>15</td>
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</tbody>
</table>

The University of Utah Biochemistry Department is associated with the Medical School, which has no undergraduate teaching mission and lists an additional 12 faculty members with primary research in Biochemistry.

III. Challenges

A. Faculty Size: There are many challenges that we must overcome to achieve our objectives. The first, which is obvious from Table 1, is that we must dramatically increase the size of the Department faculty. With the exception of the University of Utah (which does no undergraduate instruction), the Department of Biochemistry and Biophysics at OSU has the smallest faculty of all the programs in Table 1. Realistically, it would be very difficult to supplant programs with faculty sizes that are two to ten times that of our current faculty. In addition, it is unlikely that any of the top 5 programs will drop significantly from their current standings. It would be realistic, therefore, to potentially move up to or above those programs with 21 or fewer faculty members that are currently ranked below the top 5. These include (in order of current standings) Washington University, UCLA, University of Utah, and the University of Oregon. Such a move would require a substantial investment in resources to increase the current faculty size to at least
the average for these programs (average faculty size = 18 for these four schools), equivalent to adding at least 3 full time faculty members to the Department.

**B. Faculty recognition:** Increasing the size of the faculty, assuming each new faculty contributes on an equal basis with the current faculty to all factors associated with the rankings, would only get us to the 11th spot in the Western US (or 8th west of the Rocky Mountains). Without nearly doubling the current size of the Department, it would be impossible to catch the next program (at 27 faculty members) just by size alone. Thus, it would be the quality and recognition of the faculty that will need to be improved in order to reach our goals. The challenge here is that since the 1993 NRC rankings, the Department has seen the retirement of three highly recognized faculty members (including the Department's lone member of the National Academy of Sciences) with large and well-funded research programs. At this point, the demographics of the faculty in the Department can best be described as mid-career. Although there are several members of the faculty who are building strong research programs and reputations (and who will be the foundation of a strong program for the future), there is a gap in stature at the top end of the faculty. Thus, as the Department plans for growth to increase the overall size of its faculty, there needs to be an effort to fill at least one of those positions with a scientist that already enjoys a strong national presence.

**C. Graduate Program:** The current total number of graduate students in the Department is 20. This is the size of entering classes at many of the top ranked programs. One of the primary challenges in this program is to increase the number and quality of applicants from qualified undergraduate students from US institutions, and improve our ability to attract the best applicants to OSU.

Factors that affect the number of applicants received by the Program include:

1) National reputation of the Department and its faculty
2) Competitive stipends and benefits
3) Successful advertising of the Program nationally
4) Success of former students

Factors that attract students to the program include:

1) Broad range of research opportunities
2) Stability in funding
3) Atmosphere of a Graduate culture

**D. Attracting Postdoctoral Associates:** There are currently very few postdoctoral associates in the department, suggesting that the Department is attractive to highly qualified applicants. The factors that affect the number of Postdoctoral Associates in the Program include:

1) National and international reputation of the Department and its faculty
2) Levels of Grant funding
3) Successful advertising of the Program nationally
4) Career training opportunities
IV. How to reach our goals

In order to achieve its goals, the Department will play on its strengths, but recognize the need to maintain a faculty with a broad range of research interests. This latter point is important because of the strong instruction mission of the Department and because the field of Biochemistry and Biophysics is dynamic and unpredictable. The current strengths of the Department lie historically in Biophysics (more now in Structural Biology) and in metabolic and environmental biochemistry (through its ties with the Linus Pauling Institute and the Environmental Health Sciences Center, but also through the focus of several faculty research programs in oxidative stress). A potential area of strength for the Department is in cellular and developmental biology, but this relies on the future success of junior faculty members.

A. Growing the core faculty:

Strategy for New Faculty Staffing: In order to increase the stature of the Department and to provide research opportunities for graduate students and postdoctoral associates, the Department needs to increase its faculty size. The strategy for staffing includes a plan to direct growth in certain targeted areas (focusing on current and emerging strengths in the Department) and mechanisms to fund those positions. At the same time, it is crucial that the Department develop a plan to maintain breadth in the general areas of biochemistry and molecular biology. The plan is to add faculty in the recognized area(s) of strength (structural biology, and metabolic and environmental biochemistry), areas required to maintain broad expertise in biochemistry and molecular biology, and areas of emerging strength.

1. Biophysics/Structural Biology (1-2 new faculty): The Department currently has good representation in the areas of X-ray crystallography and spectroscopy. The areas of continued growth will be in mass spectrometry and computational biology. Growth in mass spectrometry is best accomplished in conjunction with the Environmental Health Sciences Center at OSU and, therefore, is dependent on continuing support for the Center. There are immediate opportunities, however, to grow in the area of computational biology through the recently approved Provost's Initiative in Computational Biology and Bioinformatics. Other potential areas of growth include biological nanotechnology through coordination with ONAMI initiatives. The overall goal is to become recognized as a tier 1 program in Biophysics/Structural biology on the West Coast. The biophysics/structural biology programs on the West Coast (west of the Rocky Mountains) are listed in Table 2, along with the level of recognition (as perceived by a group of faculty) for those programs. Comparing the available data shows that many of the programs that currently rank above OSU as biochemistry programs (Table 1) also rank above OSU in the area of structural biology (Table 2). Although there is likely no direct cause and effect, one strategy to becoming better recognized as a biochemistry program on the West Coast would be to move the Department from a tier 2 to tier 1 structural biology program.

Table 2. Structural Biology Programs' West of the Rocky Mountains and perceived rankings (Tier 1 and Tier 2). Those not considered in the top 2 tiers are not ranked

<table>
<thead>
<tr>
<th>State</th>
<th>Institution</th>
<th>Tier 1 (1) or Tier 2 (2)</th>
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2. Metabolic and environmental biochemistry (dependent on the LPI and EHSC): This area of strength is directly tied to the strength of the Linus Pauling Institute and the Environmental Health Sciences Center, and growth in this area will be left to the Institute. The Department will continue to facilitate the growth of the LPI by providing a tenure home to scientists in that Institute who are qualified in areas of biochemistry and/or biophysics and who fit the mission of the Department.

3. General areas of biochemistry and molecular biology: One of the primary strengths of the Department is that it provides a breadth of expertise in the general areas of biochemistry and molecular biology. Recent and pending retirements, however, have and will continue to erode areas that include protein and nucleic acid chemistry and biochemistry. The challenge for this Department is to provide resources to maintain and grow in these areas, despite fiscal constraints imposed by the greater strategic plans at the College and University levels.
4. Cellular and developmental biology: This is an emerging area of strength for the Department, but is primarily dependent on the future success of three junior faculty members, currently at the Assistant Professor level. The direct relationship of these areas to human and animal health, however, makes them the most appropriate for development through the College of Science and the University's Capital Campaigns.

Mechanisms for funding new faculty positions: The major impediment to growth in the size of the Department faculty is the dependence of Department funding for faculty lines on General Funds through the College of Science. These funds are currently strongly tied to contributions to teaching (measured by quantity and not necessarily quality) rather than research. In order for the Department faculty to grow, there needs to be a new formula to fund faculty salaries and startup packages. The following are the immediate, medium range, and long-range steps that the Department can take towards the goal of increasing the size and stature of the faculty.

1. Provost's Initiative (1-3 years): The first round of funding under the Provost's Initiative includes a program in Computational Biology and Bioinformatics. The approved plan will add 3 new faculty members under the Center for Gene Research and Biotechnology, with eventual assimilation of these scientists into home Departments funded partly or fully by the respective Colleges. Although there is no guarantee that any of the 3 new faculty members will land in a particular department, the Department Biochemistry and Biophysics was a strong supporter of this Initiative and our strength in Structural Biology should make us an attractive tenure home for a scientist with interests in the areas of Computational Biology and Bioinformatics. This initiative, however, is an ideal opportunity to directly fund the planned growth in the targeted area of Structural Biology. To take advantage of this opportunity, there are immediate steps that the Department faculty needs to take:
   a) Faculty members in Structural Biology and Biophysics need to become involved in the Search Committees, interviews, and selection process.
   b) The faculty must insure that we are attractive to a potential candidate, but also must insure that a candidate meets the requirements of the Department (recognizing that all members of the faculty are involved in the instruction mission).
   c) The Department must be willing and able to provide space and possibly contribute toward startup packages.

This is an immediate opportunity to attract into the Department ~ scientist with national stature and in a recognized area of strength. More towards the future, the faculty of the Department should develop a plan to submit a new proposal if and when the next round of Provost Initiatives is announced. One area that we should consider for such an initiative would be biological nanomaterials (to take advantage of NSF and ONAMI initiatives).

2. Non-Institution funding (1-5 years): With its strong association to the Linus Pauling Institute and the Environmental Health Sciences Center, the Department has several faculty members that are partly or fully funded by mechanisms other than the University's General Funds. The Department, however, cannot rely entirely on such mechanisms to grow its faculty. The core of the faculty (representing only 12 members) is constantly pressured by growing instructional duties (as the population of undergraduates at OSU grows). The Department will define specific mechanism to self-fund one to two junior faculty lines. In previous years, the size of the Department faculty was larger (by 1-2 positions) than could be supported by the General Funds budget. At that time, the extra FTEs were funded by frequent sabbatical leaves and faculty career development awards. There are currently few sabbatical leaves, and career development award opportunities are now rare. However, there are opportunities to use grant funds to help fund new faculty lines. Members of the faculty will be encouraged to put at least one term of their academic salary on grants to support a larger faculty without relying on College of Science
funding. The advantage to these faculty members is that they reduce their instructional load (being able to focus and thus become more competitive in the research arena). The Department can use this approach to fund general areas that are important to biochemistry and molecular biology as part of its mission to provide broad expertise for instruction and for graduate training (and through a mechanism that is not directly tied to the College of Science). This mechanism can be set up immediately, but will require 1-3 years to build up (to allow faculty the time to budget salary release into new grant proposals or competitive renewals). The objectives and timeline can be defined as follows:

a) Year 1-3: Have, on average, 2 BB Faculty members fund 1 term each of their 9 month salary on grants and contracts on a continuing basis beyond year 3.
b) Year 3: Hire first junior faculty member, using accumulated salary savings for startup package, and salary funded by continued "buy-outs" as outlined in a) above.
c) Year 3-5: Have an average of 4 BB Faculty members fund 1 term each of their 9 month salaries on grants and contracts on a continuing basis beyond year 5.
d) Year 5: Hire second junior faculty member, using accumulated salary savings for startup package, and salary funded by continued "buy-outs" as outlined in a) above.

In order for this mechanism to work, the College of Science and the Department must commit to the following:

a) College of Science: The COS must commit to maintaining at least the current level of support from General Funds and must commit to returning all salary and benefit savings to the Department to be used for recruitment purposes.
b) Department: The Department will commit to expanding its overall research funding levels. The specific objectives to achieve this include:
   1) (Years 1-5) Set as a goal that every faculty member have an externally funded ROt type grant within 2 years of joining the Department
   2) (Years 5-10) Set as a target an average of 2 externally funded ROI type grant per faculty member.
   3) (Years 3-10) Shift much of the current NSF funded research programs to NIH funded programs.

3. Development (1-10 years): The Department will identify specific areas and problems that would tie in with the OSU Capital Campaign, with the push to fund a senior faculty position in the area of human or animal health. Some potential areas of concentration would be the biochemistry of aging, cancer, neurodegenerative diseases (for example, ALS) and environment related diseases. This would be the best opportunity to attract a scientist onto campus with a national and international reputation (at or approaching the level of the National Academy of Sciences). This will require engagement of the faculty in the campus-wide Capital Campaign, helping to identify potential donors with the ability to fund (or contribute to funding) a named Professorship or a Chaired Professorship. To align this with the goals of the College of Science and University goals, the emphasis for this initiative will be in the area of human or animal health. This fits into the plan to grow the faculty in an emerging area of strength, and provide a readily "sellable" concept to potential donors. In addition, these areas are aligned with the ongoing efforts to develop a transgenic animal facility at OSU.

B. Building stature and research opportunities from current non-BB OSU faculty: This Department has always had a strong Affiliate Faculty program. This program was put on hiatus as we reconsidered the rights and responsibilities of such faculty. We plan to reinvigorate this program starting this year. The goals are:

1. Year 1: Thin the current list of affiliate faculty by removing those Affiliate Faculty that have not contributed to the Graduate Program in the past 5 years,
2. Years 1-5: Invite new additions at the junior and senior levels to develop a list of Affiliate Faculty that is equal in size to the full faculty.

C. Graduate and Postdoctoral Recruitment and Funding:

1. Fellowships: One strategy that can have a major impact on recruiting of high quality graduate students and postdoctoral associates would be to establish at least one Graduate Fellowship that guarantees some level of support for four years to one incoming student each year and one Postdoctoral Research Associate that provides support for three years. These are two high priority goals for Development. Assuming $30,000 per year to fully support a single graduate student (stipend plus tuition) and an annual payout at 5% from an endowment, the Department will need to raise $600,000 to establish a fully funded Graduate Fellowship. Each fully funded Postdoctoral Fellowship will require funding of at least $55,000 at current NIH rates (salaries plus benefits). An endowment for one such fellowship would thus be at least $1.1 million. At these rates, it would be more reasonable and effective to focus all of our energies on Development efforts for a Named Professorship. However, we would argue that such Fellowships should be used to support students in funded laboratories. Therefore, a reasonable strategy would be to define Graduate and Postdoctoral Fellowships that fund HALF of these anticipated costs, with half from research grants of the respective laboratories. Thus, the endowments that would need to be raised to establish graduate and postdoctoral fellowships would be $300,000 and $600,000, respectively. Our Development objectives are:

2. Outreach and direct recruitment: One strategy to increase the pool of qualified applicants to the Department graduate program is to have faculty visit Universities and sell the Department and its research. Traditionally, this has relied solely on invitations from Institutions to individual members of the faculty to present seminars to other research programs and departments. We will take advantage of this mechanism by tying these invited seminars to recruitment for our Graduate program. However, the Department cannot sit and wait for such invitations, and there are many smaller universities and colleges (from which we have had success in recruiting students) that do not fund research seminar programs in biochemistry and biophysics. Thus, the Department will start a program to send faculty out to specific institutions (both regional and national) as a proactive outreach effort. The objectives of this initiative are to:

a. Associate recruitment of Graduate students with scientific seminars at those Colleges and universities that have undergraduate programs. To do this, we will provide all faculty who plan to present scientific talks at undergraduate institutions with Department postcards and posters for distribution, and ask that such faculty request at least one hour to meet with junior and senior undergraduates to describe the training opportunities available in the Department Graduate Program.

b. Send members of the faculty and current graduate students to Colleges and Universities to present scientific seminars and to advertise the Department Graduate Program. The Department will fund 5-6 members of the faculty to present scientific seminars. We will target smaller institutions that have undergraduate programs in chemistry and in biology, and at least 2 such trips will be to institutions that are traditionally associated with underrepresented groups in the areas of Biochemistry and Biophysics. The travel expenses of the faculty member will be borne by the Department of Biochemistry and Biophysics at OSU. As a requirement, the faculty member or student will request at least one hour of access to junior and senior undergraduates in the host department for the purpose of recruiting applicants to our Graduate Program.
Fourth Appendix to the Minutes

MASTER OF ARTS IN INTERDISCIPLINARY STUDIES

GRADUATE COUNCIL FOLLOW-UP PROGRAM REVIEW 2005

A follow-up review of the Master of Arts in Interdisciplinary Studies (MAIS) degree program was conducted during spring of 2005. Vicki Ebbeck (College of Health and Human Sciences) and Bill Boggess (College of Agricultural Sciences) met with Ann Schauber who serves as the Director of Interdisciplinary Graduate Programs. The purpose of the meeting was to ascertain the extent to which recommendations outlined in the 2002 Graduate Council Program Review of the MAIS have been adopted. This follow-up report provides a general overview of program compliance with the recommendations, as well as a brief description of any actions that have occurred in relation to each of the specific recommendations.

Overview

It is evident that faculty associated with the MAIS program have considered each of the recommendations outlined in the 2002 Graduate Council Program Review of the MAIS. In general, the MAIS program continues to evolve in response to the various recommendations. Some changes have already been implemented, while other changes are proposed or in the planning stages. Changes that have been implemented include the development of a vision statement, the formation of an advisory committee, the department representing the primary field taking responsibility for and being credited with MAIS students, and the identification of a faculty member from the primary field before an applicant is accepted to the MAIS program in order to facilitate the advising process. The adoption of the other recommendations has yet to occur but will result when a Category I proposal that has been written to create a parallel MSIS degree is submitted and approved, an MAIS Admissions Screening Committee is established and starts operating as expected in fall of 2005, a transition plan for the MAIS program to align with the policy that 50% of credits be graduate-only courses is formulated and submitted, and two new courses that are currently being developed become regular curriculum offerings.

Only a single recommendation of all the primary and secondary recommendations outlined is not slated for adoption. The recommendation was that three fields of study be required in a MAIS program with no two fields of study from the same department. The intention at present with the MAIS program is to have students bring together three fields of study, however, there will be no stipulation as to the minimum number of departments that must be involved. The reasoning for the original recommendation was to ensure that the MAIS program indeed attracted students truly interested in adopting an integrated perspective and did not serve as a surrogate discipline-based degree. It is not unusual for discipline-based degrees to necessitate work from two departments in order to meet major and minor course requirements and so coursework from three departments would have further assured the uniqueness of the MAIS experience. Nevertheless, the counter argument posed for allowing the possibility of coursework from less than three departments is that now a more rigorous admissions process will be implemented. Admission will now involve pre-advising, an application essay, and a screening admissions committee that will bolster the likelihood of admitting only those students genuinely interested in pursuing an integrated approach irrespective of the number of departments involved. We are cautiously
optimistic, but not convinced that these new procedures will ensure that the MAIS does not continue to function as a surrogate discipline-based degree in some cases. We recommend that the Graduate School carefully monitor this aspect and continue to encourage the development of appropriate disciplinary degrees.

Responses to Specific Recommendations

Primary Recommendations

- Establish a clear vision of the educational purpose of the MAIS that should be to provide students with a true interdisciplinary experience.
  
  *A vision statement for the MAIS program was written by the MAIS Advisory Committee in September of 2004. The vision statement highlights the educational purpose of integrating or synthesizing information to provide a more holistic insight.*

- Require three different fields of study in a MAIS program with no two fields of study from the same department.
  
  *A draft of a Category I proposal requires three different fields of study for the MAIS, however, two or three of the fields of study could come from the same department.*

- Eliminate the requirement that one of the fields of study be from the College of Liberal Arts.
  
  *A draft of a Category I proposal eliminates the requirement that one of the fields of study be from the College of Liberal Arts.*

- Each applicant should identify the intended primary field of study and, if the applicant is accepted, the department representing the primary field should take responsibility for and be credited with the MAIS graduate student.
  
  *Each applicant does identify a primary field of study and now the department representing the primary field takes responsibility for and is credited with the MAIS graduate student.*

- Require each applicant when completing his or her letter of intent to describe an issue that lends itself to an interdisciplinary perspective and offer a plausible suggestion of how two or more specifically identified disciplines could be integrated to address the issue.
  
  *The admission process has been modified to now require applicants to write an essay describing their interest in interdisciplinary work. An MAIS Admissions Screening Committee will be established in fall of 2005 to evaluate the essays to determine if each applicant makes a convincing case for interdisciplinary study.*

- Require that at least 50% of the credits (excluding blanket-numbered credits) on any MAIS program of study be graduate-only courses.
  
  *This policy has now been approved by the Faculty Senate and will go into effect September of 2005 for all graduate programs at OSU. The MAIS program will submit a transition plan.*

- Require that every MAIS thesis or research paper integrate at least two of the three fields of study.
  
  *A draft of a Category I proposal speaks to the thesis and project curriculum requirements integrating knowledge from two or three fields of study.*
Secondary Recommendations

- Offer a Master of Science in Interdisciplinary Studies (no language requirement) as well as a Master of Arts in Interdisciplinary Studies (language requirement consistent with a Master of Arts degree).
  
  A draft of a Category I proposal incorporates the addition of a new interdisciplinary program leading to the Master of Science of Interdisciplinary Studies (MSIS). The MSIS would not have a language requirement, while the MAIS would have a language requirement consistent with other Master of Arts degrees at OSU.

- Form a MAIS Advisory Committee comprised of representatives from the Graduate School and faculty involved with the MAIS degree to be responsible for reviewing and improving degree requirements and implementation.
  
  An MAIS Advisory Committee has been established and operational since spring of 2004. The committee is comprised of representatives from the Graduate School and faculty involved with the MAIS degree.

- Clarify the operational differences between the thesis and research project options.
  
  The MAIS Advisory Committee has created a draft of a document that explains the similarities and differences with theses and projects.

- Require that an MAIS program committee chair from the intended primary field be identified before an applicant is accepted to the MAIS program to facilitate the advising process.
  
  Prospective MAIS students are now encouraged to locate a faculty member from each of the three fields of study who will support their efforts before submitting an application. Meetings held once a term for students admitted to the MAIS program also now facilitate the advising process. The meetings involve guest speakers as well as the opportunity for students to ask questions and learn from each other.

- Require at least one integrative course in every MAIS program of study (e.g., Systems Thinking and Practice that is cross-listed as BA 565, ENGR 565, H 590, and HORT 590).
  
  Two new courses, currently in development, are proposed for both MAIS and MSIS students. A 1-credit course (IS 511: Introductions to Interdisciplinary Graduate Studies) will be taken in the first year of study and a 3-credit course (ISI 512: Applying an Interdisciplinary Perspective) will be taken in the second year of study.