Department of Statistics

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Introduction and Department Overview

The Department of Statistics (DoS) resides in two colleges at the University of Nebraska in Lincoln, the Institute of Agriculture and Natural Resources (IANR) and the College of Arts and Sciences (CAS). These two colleges are representative of the land-grant and comprehensive research missions of the University of Nebraska-Lincoln (UNL), respectively. Distinctions between these two missions are further emphasized through a split-campus physical plant, wherein IANR resides on "East Campus" and CAS and other comprehensive research colleges reside on "City Campus." Formation of the Department of Statistics occurred only recently (2003) through the merger of two entities, the former Biometry Department in IANR and the former Statistics Division in the Department of Mathematics and Statistics in CAS. Following the merger, DoS retained its tie to both colleges through dual administrative oversight. That is, the Department reports to deans for the agricultural experiment station (Agricultural Research Division, ARD), the College of Agricultural Science and Natural Resources (CASNR) and CAS. ARD and CASNR comprise the Institute of Agriculture and Natural Resources. Because there was no unified Department of Statistics until recently, many specialized statistics programs have evolved over time in various departments at UNL, including: Educational Psychology, Economics, Engineering, Psychology, Sociology, and Survey Research & Methodology. The last Cooperative State Research, Education, and Extension Service (CSREES) program review of the former Biometry Department was conducted in 1999.

The Department currently has 13 faculty members, including 10 regular faculty, one emeritus faculty, one research assistant professor, and one split-appointment faculty (80% Gallup Research Center). A search is currently underway for a new faculty position in bioinformatics. Current FTE allocations are 4.75 (teaching), 5.55 (research), 0.5 (administration), and 0.4 (service). Each faculty has a tenure home in either IANR or CAS, and adheres to those respective processes for promotion and tenure. The faculty is engaged in undergraduate and graduate teaching, basic and applied research, and service. The Department does not have an undergraduate program, but offers an undergraduate minor in Statistics and offers many undergraduate service courses for non-Statistics majors. Forty-two students are currently enrolled in the graduate program where they can earn either an M.S. degree (non-thesis, primarily) or a Ph.D. degree in Statistics. The M.S. degree was adopted primarily from the previous Biometry program, while the Ph.D. degree was imported from the Statistics Division. Basic and applied research are conducted in many topic areas, such as survey and behavioral statistics, statistics in sports, design of experiments, decision analysis, bioinformatics, linear models, categorical data analysis, dynamic biological systems and modeling, and multivariate analysis. Service activities include walk-in and telephone consulting, outside consulting to industry and other non-UNL constituents, and participation in departmental and university governance. Four additional FTEs provide office and technology support: one secretarial position, one administrative assistant, one statistical software specialist, and one computer hardware and networking specialist.

The DoS has recently consolidated all faculty offices into the north-wing third floor of the newly renovated Hardin Hall on East Campus. This space contains enclosed offices for faculty and technical support staff, a departmental office, a conference room, a statistics

library, and shared office space for graduate students. A first-floor space in Hardin Hall may also be available for furnishing as several computerized classrooms. Rooms have been retained in Avery Hall (City Campus) for faculty and graduate student assistants; most of the statistics classes are still held there. With the exception of computer studio classrooms, which currently limit the number of sections of applied statistics courses that can be offered, current space and facilities available to DoS provide an adequate environment for department teaching and research. Planned computer studio classroom space to be built in Hardin Hall should alleviate this problem.

Department funding originates from CAS, ARD, and CASNR for instruction, stipends, and operating budgets, totaling approximately $220K annually. Grant support (mostly noncompetitive) for DoS is among the lowest in ARD, adding about another $90K/yr. The current funding stream provides few resources for research and graduate student support (outside of Teaching Assistant instructional funds) that will be needed to meet the Department's goal to grow their Ph.D. program.

This CSREES review was combined with an internal UNL Academic Program Committee (APC) review. In addition to the four external Review Team members, an APC representative served on the Team and one graduate student from the Department. To ensure that both colleges were represented in the review, faculty members from IANR and CAS were included as internal Team members (see Appendix). All Team members participated fully in the review process, except that the graduate student representative was excused from final recommendation and report authoring. Review sessions commenced on Sunday afternoon and ended Tuesday afternoon. Exit interviews were provided to faculty and administration separately on Wednesday (see Appendix for the review agenda).

Executive Summary

The Department of Statistics has expended considerable time and effort to make the 2003 merger of the Biometry Department and the Division of Statistics (Dept. of Mathematics and Statistics) a reality. Similar efforts have succeeded elsewhere (e.g., University of Florida), so precedents do exist for such academic program changes. In addition to notable strengths within the Department itself, there is strong administrative support for the new program and a university-wide appreciation for the value of statistics both in research and in training quantitatively literate professionals. This broad-based UNL attitude provides a healthy climate for the Department to flourish.

This Cooperative State Research, Education, and Extension Service review (in collaboration with a UNL Academic Program Committee review) was charged with providing some insights into a rather large number of questions facing the DoS teaching and research programs, as well as concerns about the internal climate and culture in the Department. The Review Team met with administrators twice early on in the review schedule (see Appendices). In addition, the Team also met with most DoS faculty and staff individually, graduate students, heads of departments served by Statistics, and faculty from other statistics programs on campus. In addition to numerous observations, the Team's final report contains recommendations that span strategic/tactical directions for the Department that may take years to realize, as well as very specific, targeted recommendations that can be implemented in the near future. During deliberations, the Team addressed issues across four broad areas: (1) the current level of faculty cohesion in the Department; (2) the spectrum of research conducted by the Department; (3) graduate and undergraduate teaching; and (4) administrative operations of the new department. Because of the highly inter-related nature of an academic department's different elements, it was not possible to entirely decouple recommendations emanating from these different focus areas. Throughout the report there are many instances of overlap; in many cases, recommendations in one area will have collateral impact in other areas. The following are a few generalized findings from the Team's review.

- When two programs merge, they often bring together unique strengths that make the newly formed unit especially capable. The DoS has inherited a strong statistical consulting and applied research program, an important undergraduate teaching curriculum, a popular M.S. program, and a core of methodological statistics research. The Team feels that it is critical to build on and integrate these existing capacities, and use them to establish/expand capabilities in other areas, particularly in regard to expanding their Ph.D. program and building their City Campus presence. We recommend that the Department reach out to other departments and market their capabilities more aggressively. This applies equally well to teaching, consulting, and research in all its forms. A primary new research area for the Department is survey and behavior research, and the Department's participation in the Nebraska Research Initiative Core Facilities grant is an important step in this direction. The Team feels that it is imperative for the University to allocate the needed space for this effort as soon as possible.

- Several concerns have been voiced with regard to the promotion and tenure process for Department faculty. There are *perceived* inequities among the faculty resulting from: faculty members have tenure homes in different departments (either IANR or CAS), most new faculty have CAS appointments and lack obvious mentors in the CAS tenure process, and teaching and consulting responsibilities differ between IANR and CAS appointments. The Team acknowledges the importance of those perceptions, but feels that many of those concerns can be mitigated by carefully crafting more explicit and encompassing Departmental tenure expectations for faculty. These statements should articulate agreed-upon respect and reward for the full complement of teaching, research, and consulting. Furthermore, those expectations should be transmitted firmly and unequivocally to each college's tenure process so that any dossier is treated identically regardless of tenure home.
- Given the strengths noted above, the Department should already be moving rapidly forward with the focused and aggressive agenda that it has outlined. Nevertheless, progress is partially stymied because many of the faculty members perceive impassable differences within the Department. The Team views these attitudes (not so much "problems") as disruptive for the tasks ahead and draining of productive energy from the Department. An increase in team spirit needs to be established from a base of trust and respect, including agreed upon appreciation for the full range of research, teaching, and service, including their place within the tenure process. Interactions with graduate students are also an important component of the Department climate, and could be improved by making Departmental governance more inclusive and by meeting students' basic academic needs in a more timely manner.
- Because of the breadth of departments served by DoS teaching programs, it is important that the curriculum meets their clients' diverse needs. This is true for both undergraduate and graduate curricula. Consequently, DoS should periodically assess the needs of departments served, being particularly attentive to course content, course availability, and instructors. The current expectation is that because the Department's teaching load will continue to grow, not shrink, their customer base will further expand. With regard to the Department's own students and programs, it should carefully evaluate the current graduate curricula for both their M.S. and Ph.D. programs.
- The needs of this newly formed department and its desire to grow in new directions requires a somewhat different approach to leadership than what is required of a department in stability mode. The Chair has become an agent of change for the Department—and must continue to do so—and not allow more routine administrative demands to consume large amounts of his time. The Team feels that the Chair has the needed skills, innovative spirit, and personality to take the Department where it wants to go, but he needs to delegate many traditional duties so that he can move the program forward most effectively.

Departmental Climate

The institution has taken a significant academic leap in merging departments from two different colleges. The Team noted that this transition had been recommended by the three previous CSREES reviews. It is both commendable and gratifying that UNL has been able to accomplish this transition. The Team noted with some concern that this merger has been described as a "fragile experiment," but, indeed, it is. While many institutional and administrative barriers have been negotiated, the much harder task of creating a cohesive program unit from two very different cultures leaves much difficult work to be done.

On the positive side, both faculty in the Department and UNL administration have voiced commitment to the new department's success and a willingness to encourage and nurture its future development. The Department has, as part of this merger, established by-laws and a strategic plan, and combined curricula from the prior programs. This new endeavor brings many new challenges and opportunities for both the department and administration. Based on the extent to which the Department's Self-Study document wrestled with internal concerns, the Team spent considerable time discussing the issues identified in the report relating to departmental culture, climate, philosophy, equity, etc. The Team feels that a cohesive and focused department is critical to the program's successful future development.

Faculty

It is a well-accepted component of the UNL agenda that diversity in all its manifestations is part of a healthy academic culture. This includes traditional concerns about gender and ethnicity, but extends also to academic diversity. The Team views academic diversity, in this case, as the principal near-term hurdle facing the new department. But, it does not appear to this Review Team to be the overwhelming chasm portrayed in the Self-Study Report. Rather, this challenge can be readily addressed by faculty through changes in attitude, specifically by each faculty member taking responsibility for developing an open, willing, and committed attitude towards building a cohesive and collegial departmental environment

It is perfectly natural to have conflict arise when two academic departments are combined, and its absence would be rare. However, the current atmosphere in the department seems to be one of a non-cohesive unit that sees more division within the Department than concerns about events and situations occurring outside. Circumstances at this university (i.e. dual campus) and other factors have conspired to accentuate natural departmental differences. The Team is concerned that an over-attention to internal differences may ultimately cause the Department to miss/disregard external circumstances that could be real opportunities for (or threats to) Department success. Rather, the Team encourages the Department to begin to consider differences inherited from the dual-college ancestry as strengths to be embraced and appreciated, rather than barriers that need to be removed. The Department needs to focus its attention on extra-departmental issues and the critical challenges it faces, which will ultimately determine the long-term fate of the Department. The Team recommends the following to help minimize and mitigate perceived differences.

Recommendations

- There needs to be a well thought-out and fully participatory effort at team building among the faculty to promote internal trust and respect. This can be accomplished through many different activities, including for example social events, facilitated retreats/outings, an annual science fair—with some intent to establish traditions of personal interaction separate from the usual office environment. Respect can be nurtured by establishing an awards committee to recognize *contributions to the Department* that are either internal or external—which may be accomplishments by faculty and/or students. These are intended not only as rewards for individual success, but importantly to highlight contributions towards advancing the Department's goals.
- There needs to be a clearly articulated and agreed upon description of teaching loads, buyout policies, job descriptions, research performance, etc. While current departmental by-laws include stated expectations for promotion and tenure, expectations need to be spelled out clearly in such a way that all types of research, consulting, service, and teaching efforts are mutually respected and fairly rewarded, regardless of an individual faculty member's chosen emphasis areas. This may require relaxing some long-held, traditional ways of thinking, and beginning to think in unison as the *first* Department of Statistics. If the Department has a strong commitment to articulated expectations and values, and these are expressed to the college at promotion and tenure time, there should be no difference between IANR and CAS in how a dossier is evaluated; it should make no difference through which college a P&T dossier circulates (see also Academic Issues, below). The deans appear to support such a view, and should be called upon to visit the faculty and reiterate their position on this matter.

Graduate Students

The Team supports enthusiastically the student-centered focus of the Department and commends the faculty for taking that position. This ideology seems to be widely acknowledged by the faculty. Still, the review turned up inconsistencies between theory and practice in this area. For example, some of the tasks that directly impact students are not being handled promptly, or at all, in some cases. Furthermore, delegation of those responsibilities does not appear to occur as needed to ensure that there is proper coverage of those duties regardless of which faculty member is available. The following tasks, which affect graduate students directly, are important components of assigned faculty responsibilities to students.

1. Make TA assignments in a timely fashion, so that TAs can prepare for teaching fall semester classes.
2. Inform graduate students about opportunities for fellowships.
3. Write letters of recommendation for students.
4. Provide an orientation for incoming graduate students and a more extensive training for new TAs.

In another example, there seems to be a disconnect between how faculty view the preparedness of new graduate students and what the students feel their preparation has been. Many entering students with good quantitative backgrounds, but little exposure to statistical concepts and methods, have struggled with first-semester graduate classes that assume an intermediate level of statistical knowledge (see also Graduate Teaching, below). A number of opportunities exist for improving the climate for graduate students and helping them succeed fully in their academic and teaching responsibilities.

Recommendations

- Faculty should take a more active role in advising first-year graduate students. The graduate committee should prepare guidelines for such advising to ensure that there has been meaningful faculty-student contact early in the student's first semester. Furthermore, whoever occupies the leadership position in dealing with graduate students, whether permanent or interim, needs to allocate priority time to adequately serve students' needs. Informal interactions between faculty and students are also strongly encouraged as a supplement to formal advising. This will help create a more positive and less stressful initial semester for graduate students and lead to better classroom performance and improved competence as teaching assistants.
- Graduate students should be included in the graduate committee and any other departmental committees where decisions are made that affect graduate students. Representatives to such committees could be elected from a newly formed graduate student association—established to promote educational and social activities among the graduate students and a vehicle for contributing to departmental developments. This form of participatory governance will allow graduate students a voice in departmental activities, e.g., the desire for at least one computer in each grad student office. This new graduate student association could also facilitate the appointment of peer mentors to first-year grad students and its existence would enable access to UNL funds and equipment (e.g., excess computers) available to clubs and organizations.

Research and Consulting

The Department of Statistics engages in a broad range of research spanning theoretical to methodological to applied statistical research (referred to as consulting). These various aspects of research should be viewed as a continuum, rather than a research-consulting dichotomy. Although the current cadre of Department faculty members originates from different traditions, the Team perceived that a rich, research capability exists across this continuum. Each of these emphases is important to a well-rounded and broadly engaged faculty, creating a Department of Statistics that is respected, active, and a valued academic resource for the institution and the state. Furthermore, the traditions from which the faculty emanates provide the foundation for powerful collaborative research groups *within* the Department that combine keen technical insight with extensive experience in the application of statistical methods to disciplinary problems. As noted in the previous section, this diversity of skills and background endows the Department with a foundation of strength, from which to build a full research/consulting portfolio of programs.

The Department has wisely chosen biometry (i.e., natural resources, environmental and agricultural statistics), bioinformatics, and survey and behavioral statistics as their three priority areas for development. The first area builds on long-standing strengths that can be continued and used to mentor new faculty members, while the second two areas are emerging as key opportunities for the Department's future development and represent ways in which faculty members currently working in other areas might extend themselves. These two emerging emphases will create many cross-disciplinary research opportunities, and will open up the possibility of joint faculty appointments, often more viable—in tight fiscal times—than department-specific appointments (see also Administrative Issues, below).

Recommendation

- The Team recommends that the department actively expand its City Campus presence. This can be accomplished in several ways. First, given the potential for DoS faculty and students to interact with researchers in the biological sciences on the City Campus, the Team suggests that the faculty consider broadening the Department's "biometry" objective to "biological statistics" or another suitable term that is inclusive of this new set of collaborators. This would not in any way diminish the value or name recognition of traditional "biometry" activities. Second, the NRI Core Facility grant, in which DoS is a partner, could be a focal point for increased presence and interaction with City Campus entities. Third, the Department should consider establishing study groups (and possibly cross-campus seminar series in emerging areas, e.g., bioinformatics, survey statistics) for these priority research areas. This could foster new collaborations, exposing faculty and students to each other's research, and create a tangible means by which Department members could help move their objectives forward.

Unless the Department continues to expand its research presence on City Campus, it may ultimately be viewed by many as primarily an East Campus biometry program. This would not only be a disservice to the broader capabilities of the Department, but limit its future growth in emerging research areas present there. In the absence of DoS as a research participant on City Campus, other existing specialized statistics programs (mentioned earlier) will likely expand to fill the void and thereby bring into question the institutional value of a department of statistics.

Applied Research (Consulting and Collaboration)

A particular strength for statistics in an academic setting is the degree to which collaborations with researchers in other disciplines motivate research of all kinds. The Department's long tradition of cross-disciplinary collaborations helps foster many new research opportunities. The Team is impressed with the rave reviews received from faculty in other departments about the DoS's contributions to the research programs in these departments. At the same time, some findings led us to believe that further development could be pursued in making UNL researchers aware of this superior capability. For example, the Team understands that student consulting hours have often been poorly attended, causing various problems in the consulting practicum course, not the least of which is reduced value for the enrolled students. In addition, a relatively new set of eager

collaborators and clients exists in the social sciences on City Campus that appears to be unaware of the capacity for the Department to become collaborators on research projects. These findings, alone, suggest that enhanced marketing of the DoS program could benefit the training of graduate students as new statistics professionals and expanded research opportunities for the Department.

Recommendation

- The Team recommends that the Department identify ways to market their programs so that their capacity can be better understood by others. For example, an integrated clearinghouse for incoming consulting clients would provide a simple entry point through which researchers needing statistical input could be directed to the appropriate faculty member or student. The current DoS web site could be augmented with a consulting page that would automatically route client requests to a consulting coordinator or to specific faculty based on their published areas of expertise/interest. In addition, within the Nebraska Research Initiative Core Facility for social and behavioral research, an opportunity exists to build a particularly focused resource for disciplines that rely on survey research (see New Research Initiatives, below).

Improved marketing of the Department's consulting program offers numerous benefits. It provides many opportunities for joint research projects wherein the Statistics faculty is an integral member of the research team. Such team membership opens up the possibility for project funding to support DoS graduate students, and thereby help build the Ph.D. program. Broader recognition of the DoS capabilities across campus will also help expand its City Campus presence in research (see prior recommendation on p. 10). The consulting arena also presents a mentorship opportunity to pair experienced applied statistical researchers with faculty who have not participated in a great number of collaborative relationships. Consulting is an acknowledged and respected strength of the Department; it makes sense to make full use of this strength as a springboard for growing the program in other directions.

New Research Initiatives

One critical area for the development of all types of research activities is the submission of grant applications to funding agencies. The DoS faculty members are currently involved in grant development to varying extents, but the rate of competitive proposal submissions per year per FTE (ARD research FTEs only) is 0.35 for the period 2002-2004. This compares to the IANR average of 1.3 during the same three-year period. Total grant proposal submission rates (competitive and noncompetitive) for the same period show an even greater, five-fold disparity between DoS performance (1.21) and that of other ARD faculty (6.88). While success rates for extramurally supported research depend on many uncontrollable external factors, grant writing itself only requires a commitment on the part of the investigator, including opportunity awareness, time priorities, and writing effort. Once this commitment is made, grant proposal *effectiveness* can be enhanced by taking advantage of resources readily available at UNL.

As an incentive for developing a grant culture, it is often useful to take the time to discuss and make clear the potential benefits that occur when applying for grants and develop strategies to avoid the pitfalls. Benefits include:

1. Bringing extra resources into the department via direct cost funds (e.g., for computers), salary savings via buy-outs, and overhead funds returned to the Department, which can be used to address initiatives or fund extra support for existing activities
2. Providing summer support for 9-month faculty
3. Adding critical RA lines to support the graduate program, particularly the Ph.D. program
4. Enhancing the national visibility for the Department
5. Creating opportunities for applicants to become review panel members, furthering their own careers
6. Stimulating and formulating a research plan, which is helpful whether or not the grant application is funded.

Given that an intellectual commitment emerges for creating a grant culture, there are aids that the faculty can used to make the grant application process more efficient and effective. Some actions that are often used by other departments and institutions include:

1. Identify key funding agencies for different research areas of interest; also look for less "traditional" sources of support
2. Develop and implement a plan for a range of faculty members to visit these agencies to learn about their programs
3. Have individual faculty attend grant writing workshops that focus on strategies that take into account the interests of these or similar agencies
4. Establish a close relationship with the UNL Office of Sponsored programs, in particular to gain their assistance, develop personal contacts, and learn from their expertise in preparing and submitting grants

<u>Recommendations</u>

- Where feasible, DoS faculty are strongly encouraged to take the lead on developing new grant proposals with collaborating researchers in other disciplines, or to build statistical research components into grant applications being led by those researchers. During the Team's review, some members of other departments noted that they would welcome this level of participation in developing a research project. In other cases, it may be initially challenging to educate some existing collaborators about the utility of a methodological research role that provides more tangible benefits for the statistics faculty member beyond their traditional role as a partner providing power calculations and data analysis expertise. Many federal grant programs now require statisticians on their review panels, so there is incentive for UNL researchers to fully involve statisticians in projects leading to grant proposals.

- In addition to scientific research grants, the Department is strongly encouraged to continue pursuing additional funds via fellowship and infrastructure grants from state and national agencies. For example, CSREES offers the National Needs Graduate and Postgraduate Fellowship Grants program annually to support the training of new scientists in high-need areas, e.g., bioinformatics. Also, both NSF and NIH have computing and program development infrastructure grants. A recent success of the Department is its participation in the Nebraska Research Initiative Core Facility grant to establish a core activity related to social and behavioral research that relies on surveys. One goal is to expand the Sociology Department's computer-assisted telephone interviewing lab and establish a cognitive laboratory for methodological research. A second and critical goal is to expand the staff required to support the additional activities that are involved in developing a substantial presence for social, behavioral and statistical researchers. *The Team believes this grant to be extremely critical to fostering a strong and fruitful relationship between statistics and the social and behavioral sciences.* A natural extension of this initiative is for statistics researchers to continue to build relationships with SRAM via emerging Core Facility projects.

While it has been mentioned in several places in the preceding pages that connections exit between DoS research program development and enhancement of the Department's Ph.D. program (an identified priority), the criticality of this connection cannot be over-emphasized. In reality, it might be misdirected to focus narrowly and specifically on Ph.D. program development. Rather, it is the sense of the Team that the Ph.D. program will grow naturally and in a sustainable way if the proper attention and effort is placed in building the research program in the manner noted throughout this section.

Teaching Programs

The Department's teaching responsibilities involve both a graduate teaching program that supports its M.S. and Ph.D. degree programs, along with graduate student service courses for other disciplines, and an undergraduate teaching program that offers a minor in Statistics, but no baccalaureate degree. In total, the courses now offered borrow from both the previous Biometry Department and the Division of Statistics. The average teaching load for faculty members appears to be two courses per semester, except where there is an increased emphasis on consulting work. The Self Study Report acknowledges that while there is broad faculty agreement that the students come first, tangible commitment to undergraduate teaching by all faculty is not as universal.

Graduate Teaching

The Self Study Report identifies two issues as serious problems: (1) insufficient number of teaching faculty and (2) limited computerized teaching facilities. The Team finds that those concerns are valid and need to be addressed. It is our understanding that the number of computer studio classrooms will be increased in the near future with the renovation of Hardin Hall, and this will help alleviate the latter problem. The issue of

limited numbers of teaching faculty will be addressed as part of faculty appointments in the section, "Administrative Issues."

As was noted in the Self Study Report, statistics programs have developed within many departments on City Campus. From Team discussions with representatives of these other departments and programs, Educational Psychology, Psychology, SRAM, Sociology, Actuarial Science, and Engineering, many would be interested in investigating some coordination of course offerings across departments, so that duplication is avoided and a complete suite of statistical courses is offered. Furthermore, departments on the East Campus have expressed interest in additional courses, such as analysis of non-experimental data and longitudinal data analysis. The Statistical Ecology course, being jointly offered and taught by DoS and a School of Natural Resources faculty member, is an excellent example of innovation in developing courses to fill a need in client departments.

The Statistics Department has proposed developing a 3+2 5-year program that would lead to a combined baccalaureate degree in an allied field and an M.S. in Statistics in 5 years. In principle, the first three years would be devoted primarily to the allied discipline, with the last two years focused on Statistics coursework. The allied field might be in a biological science or in mathematics. The Team feels that this could be an effective means for introducing more students to graduate study in the Department and we support further study of this proposal. Such a program could also be designed to meet an industry demand for new professionals, e.g. bioinformatics or survey statistics.

Recommendation

- As the Department works toward developing the Ph.D. program, the Team recommends that they first take a critical look at the graduate curriculum, beginning with the M.S. curriculum. There is imbalance in several dimensions. The graduate curriculum does not have the full range of courses that would benefit a Ph.D. program, and coursework is not offered in several key methodologies that are in broad use or have been developed relatively recently (e.g., Bayesian data analysis and associated statistical computing topics). This raises questions both about how effectively the current curriculum prepares graduate students for entry into the Ph.D. program and how well it trains enrolled Ph.D. candidates. Further, many incoming graduate students reported having difficulty with the first statistical methods course, STAT 802 (experimental design), due to inadequate academic preparation—this situation was noted earlier as an example of the disconnect between faculty and graduate students. This disconnect could be remedied by developing a statistics graduate section of 801 to introduce all students to many intermediate level concepts that are part of a statistics graduate curriculum. We suggest that the Department begin by appointing a small committee to conduct the evaluation. This effort could profit from examining the curricula of other applied statistics programs at UNL (see paragraph above) and discussing curricula with other departments of statistics.

  As part of this curriculum re-evaluation, the Team suggests that the STAT 801/802 sequence be given close scrutiny. Heads of several departments (Biological Sciences, Plant Pathology, and Natural Resources) expressed concern about the lack

of uniformity in the coverage, level, and quality of teaching of STAT 801/802, which is a required course for their graduate students. The Statistics Department should develop and enforce a core curriculum and level for this sequence. Client departments would welcome the opportunity to have input into this process as a way to serve better the academic needs of their students.

Undergraduate Teaching

Even without an undergraduate degree program in Statistics, undergraduate teaching (in terms of student credit hours) accounts for two-thirds of the Department's teaching load. Most of this load is generated by the Introductory Statistics course (STAT 218), taught exclusively by DoS graduate students with Teaching Assistant appointments. Demand will only continue to grow as there is substantial interest by University administration to require all undergraduates to take a statistics course. Quantitative literacy is important for functioning in society and the Team supports this University initiative.

Numeracy in the general population should not be limited to college-educated individuals, however. Members of the Statistics Department are also involved in exemplary activities to bring statistics to middle school students and teachers. *Project Fulcrum* and *Math in the Middle* are both exciting programs that will increase the quantitative skills of middle school students, increase their awareness of the field of statistics, eventually increase the numbers of students studying statistics in college, and raise the level of basic statistical understanding among the general population.

The Team made note of several findings related to specific courses, but makes no specific recommendations regarding them.

1. Engineering faculty report that STAT 380 was well-coordinated with Engineering courses in past years, but is not so well-coordinated now.
2. Actuarial science encourages their students to take STAT 380 and STAT 462/463, and feels that the students need all three of these courses in order to fully absorb the material.
3. It is important to Actuarial Science students to have a *rigorous* STAT 462/463 sequence maintained.

However, it is clear that if all students are required to take a statistics course as per the current proposal being considered by University administration, more TA support and Statistics faculty would be required. It is our understanding that 15 sections of STAT 218 are currently being offered, each taught by a graduate student with somewhat limited training—in some cases by first-year students. Great improvements have been initiated this year, however, in the training of TAs and coordination of sections of this course. Still, the Team feels that more changes are needed to ensure teaching consistency and quality in this important elective, especially if statistics becomes an institutional requirement in the future.

<u>Recommendation</u>

- The Team recommends that STAT 218 be taught by an experienced faculty member. This can be accomplished while also providing training and experience to new graduate teaching assistants. Our most important concern is that STAT 218

should not be taught by first-year graduate students. There are several ways this could be achieved. One that has been proposed, but that is by no means the only possible approach, is modeled on introductory sociology courses, which use large (e.g., 250 students) lecture sections in combination with small problem-solving sections (recitation). The faculty member would meet with this class twice each week and small recitation/problem solving sessions would meet with a TA once each week, preferably in a computer laboratory classroom. The 4 or 5 graduate teaching assistants would be supervised by the faculty member teaching the course and they would attend a teaching seminar during the fall semester. The seminar would cover such subjects as how to prepare a syllabus, develop course content, teaching techniques, deal with cheating, and other facets of teaching. Rather than assign this teaching responsibility to a current faculty member, a fixed term senior lecturer or teaching faculty member could be hired. This person could dedicate full-time attention to improve the curriculum and supervise and train the TAs.

Administrative Issues

Given the recent merger of academic units to form the current Department of Statistics, many administrative matters still need attention in order for the new Department to perform at a high level. These post-merger concerns are further exacerbated by the dual oversight structure for the DoS that includes three deans and two colleges. Despite this duality, the Review Team was impressed by the cooperative, consistent, and genuine expressions of support by the administration for making the new department a success.

The Review Team heard numerous comments about the effective work of the Department staff, providing reminders and timely information for students and excellent support for faculty and the Chair. The staff generally felt there was adequate time and resources available to provide the needed support. They also expressed interest and willingness to maintain and improve their technical skills and should be encouraged and supported in making use of opportunities as they become available. Computer staff appears to be functioning at a highly satisfactory level; support services and repairs are done in a timely manner. While staff competence and performance are not usually given much attention unless they are below par, the Team feels that throughout the recent transition and its many distractions the staff has provided much needed consistency and stability, and has demonstrated a positive and can-do attitude in light of the many changes.

College and University Administration

Most of the Review Team recommendations in this document are directed toward the Department and actions that they should consider. However there are several things that CANR, CAS, and the University administrators need to consider to translate their expressed support for DoS into tangible assistance that the Department can use to build its program. Benefits will accrue not only to DoS, but also to the many programs and students that they serve, and ultimately create a resource of value for the institution and the state.

Recommendations

- Creating an opportunity for the DoS faculty to hear expressions of College and University support *directly* (perhaps in a faculty meeting or annual forum) would be beneficial to help the faculty focus on the long-range goals of the Department.

  Currently, there appears to be a significant problem with finding a physical home for a co-located interdisciplinary group associated with the Nebraska Research Initiative Core Facility, in which DoS is a participant. The Team strongly recommends that the University identify a large area (~3000 sq ft) to house the laboratories, accompanying staff, and collaborating researchers in one cohesive unit. Such proximity will be necessary for this to be a successful endeavor and for the Department to expand their program in this area.

  Finally, it is the sense of this Review Team that, to be successful, this Department will need to expand in faculty size—both, to meet its current teaching, research, and consulting demands and to grow into a nationally recognized PhD. statistics program that will serve the University's need to "turn data into knowledge" across a wide spectrum of disciplines. There was no Team consensus toward making a specific recommendation regarding faculty size; however, given the research goals and teaching demands for the Department, it would not be unrealistic to envision a program 30-50% larger. A portion of this increase can be achieved through joint appointments (see below), but there is also a need for 100% statistics faculty hires. The core of the Department is statistics research, teaching, and consulting, so this needs to be reflected in the commitment of future hires.

Faculty Appointments

Given the ambitious agenda that the new Department has set for itself—expand its Ph.D. program, maintain the M.S. program, improve undergraduate teaching, expand into new research areas, increase grant writing—there is little doubt that additional faculty appointments will be sorely needed. However, except for the current hiring effort for a bioinformatics faculty, it is unlikely that near-term university budgets are going to be friendly toward many new appointments. Exceptions will occur where a new appointment can fulfill several identified needs simultaneously. Interdisciplinary appointments may be attractive because they are financially tenable and because many exciting research areas occur at the interfaces of traditional disciplines. Statistics is particularly well-positioned in this regard because many disciplinary sciences find themselves in data-rich research environments and are looking to turn those data into knowledge.

Recommendation

- The Department should initiate discussions with key departments to assess their need for statistics courses and to 'market' the abilities of the faculty to meet statistical research needs (consulting) in other departments. This communication opportunity will also reveal possible joint appointment interests with existing or new hires. Joint appointments (courtesy or split-budget appointments) provide natural linkages with other related disciplines. New faculty hires in DoS could be

leveraged by cooperating with other departments or colleges to share a new hire jointly appointed in two departments, e.g., a joint statistician with sociology or with SRAM with interests in survey research or behavioral science methodology, or a statistician/bioinformatician with a joint appointment in statistics and biology or biochemistry. From a university perspective, hiring a statistician who can collaborate with laboratory scientists is cost effective both in terms of startup and space costs, and in ongoing support for field or laboratory research expenditures.

Chair Responsibilities

The head of any academic program serves an important leadership role. This responsibility is no more important than when there has been a dramatic change in a program, as in this case. Based on the Team's limited interactions with a broad spectrum of university personnel, the current Chair appears to be both well liked and respected within DoS and across the university. Furthermore, this admiration was demonstrated uniformly among the students, staff, faculty, and administrators that we encountered. Nevertheless, the Team feels that during this transition period it is important to re-examine the Chair's leadership responsibilities with an eye toward making the Department more efficient, cohesive, opportunistic, and visible. Recommendations throughout this report have addressed those objectives in different ways; we note a few additional ones here.

<u>Recommendations</u>

- The Chair's obvious passion and commitment to the success of the Department are laudable, perhaps to a fault. To be even more effective, the Chair needs to enlist other members of the Department to adopt his commitment and share responsibilities to carry out the mission. Because of his leadership position, he needs to focus on the overarching goals for the Department, and delegate more specific, day-to-day tasks to faculty committee chairs. Given the size of the Department, it is not realistic to allocate budget funds for an assistant chair. However, it would be extremely useful to designate someone (future chair in training) to participate in decisions with authorization to sign and stand in for the Chair when needed. The Chair should limit his teaching and research to a level that allows adequate time to complete the essential administrative tasks promptly, which is essential for the long-term health of the Department. This may require devoting at least 75% of his time for administrative duties.
- The Team discussed several aspects of Department administration that together form a set of recommendations for the Chair to consider and evaluate.

  The Department has proposed in the Self-Study Report to revise the proportion of overhead-return funds that are distributed to the faculty. The Team heartily supports this idea, and suggests, for the common good, a 50/50 split between faculty members and the Department. Funds retained in the Department could then be used for program enrichment, such as community building activities, support for graduate students, and Department technology and support needs.

  Currently, there are discrepancies between IANR and CAS administrative

procedures and deadlines regarding position descriptions, course loads, and annual evaluations. Although we understand that several of these items have been addressed, this area should be reviewed and adjustments negotiated to minimize the administrative burden on the Chair, faculty, and staff.

To move the Department forward toward the common goals that it has identified, incentives (and disincentives) should be provided for the faculty and these 'centives linked to performance reviews. Furthermore, good academic citizenship (defined by group consensus) should be understood, recognized, and rewarded.

Promotion & Tenure Redux

While a recommendation regarding promotion and tenure was made earlier in the first section of this report, its importance to faculty morale and departmental equilibrium cannot be overstated. Consequently, we restate that earlier recommendation here.

Promotion and tenure expectations for faculty should be explicitly defined (transparent to all) by the Department to guide junior faculty and P&T committees in their evaluation. The current statement in the bylaws needs to be augmented with a more specific statement about the breadth of types and styles of research, which may include any of following: consulting, collaborative research, interdisciplinary research, and fundamental or theoretic research. Productivity and excellence should be the standard for any of the above. The college (both IANR and CAS) procedures should respect and follow the agreed upon tenure expectations written by the Department. This can be achieved through any number of mechanisms that guarantees uniform treatment, e.g., a common P&T committee or appropriate consultation between the colleges.

On-Site Review Agenda

Sunday, September 11, 2005

Sunday's meetings and dinner will be at the Embassy Suites Chancellor Rms 2 & 3

5:00 – 6:00 p.m.	Deans & Vice Chancellors meet with *External* Review Team Members **Chancellor Room 3**	*Deans/VCs*
6:00 – 7:00 p.m.	*Full* Review Team and Department Head Dinner **Chancellor Room 2**	*Stroup*
7:30 p.m.	Review Team Organizational Meeting **Chancellor Room 3**	*Review Team*

Monday, September 12, 2005

Events held in the East Campus Union may be in different rooms than listed. Please check the event schedule in the Union that day to make sure you have the correct room. Hardin Hall houses the Statistics Department and is on the East Campus at 33rd & Holdrege (north wing of Cliff Hardin Center). The building is under construction – our department is currently the only one in the building.

7:30 – 9:00 a.m.	Breakfast/University Administration Charge to Review Team – East Campus Union (ECU) **Columbine Room – East Campus Union (3rd floor)**	*Deans/VCs/Other Administrators*
9:00 – 10:30 a.m.	Department Overview – Hardin Hall (HH) Rm 355A	*Stroup/Stat Faculty*
10:30 – 10:45 a.m.	Break – HH Rm 355A	
10:45 – 11:45 a.m.	Departmental Professional Staff - HH Rm 355A *Travnicek/Westerholt*	
Noon – 1:00 p.m.	Lunch – East Campus Union (go through cafeteria line)	
1:00 – 3:00 p.m.	Meetings with Faculty Members (by appointment) – HH Rm 355A	
3:00 – 3:15 p.m.	Break – HH Rm 355A	
3:15 – 4:15 p.m.	Meet with Graduate Students – ECU **(check for room #)**	
4:45 – 6:45pm	Review Team Executive Session	
7:00 – 9:00 p.m.	Dinner with Faculty – Misty's Steakhouse & Brewery – 200 N. 11th (across the street from the Embassy Suites Hotel)	

Tuesday, September 13, 2005

7:30 – 8:30 a.m.	Breakfast – **Embassy Suites** morning buffet line	*Stroup*
9:00 – 9:30 a.m.	Departmental Support Staff – Hardin Hall Rm 355A	*Disney/Pike*
9:30 – 10:15 a.m.	Meetings with Faculty Members (by appointment) – HH Rm 355A	
10:15 – 10:30 a.m.	Break – HH Rm 355A	
10:30 – 11:30 a.m.	Meetings with Faculty Members (by appointment) – HH Rm 355A	
11:30 – 11:45 a.m.	Wrap-Up - HH Rm 355A	*Stroup*
Noon – 1:30 p.m.	Lunch with Department Heads (IANR & Selected A&S) – ECU **Cottonwood Room – East Campus Union (3rd floor)**	
1:30 - 3:00 p.m.	Meet with Faculty with Statistics Connections in Other Departments – ECU **Sunflower Room – East Campus Union (3rd floor)**	
3:00 – 4:00 p.m.	Department Overview Redux – ECU (**check for room #)**	*Stroup/Stat Faculty*
4:00 – 9:00 p.m.	Review Team Report Preparation – Statistics Library HH Rm 350E	

Wednesday, September 14, 2005

7:30 – 8:30 a.m.	**Breakfast – Embassy Suites** morning buffet line Department Head to meet with Review Panel	*Stroup*
10:00 – 11:30 a.m.	Exit Report to Faculty - ECU **Columbine Room – East Campus Union (3rd floor)**	*Stroup/Stat Faculty*
	11:30 a.m. – 12:30 p.m. Lunch – ECU (go through cafeteria line)	
12:30 – 2:00 p.m.	Exit Report to University Administration - ECU	*Deans/VCs/Other Administrators*

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