1-1-1993

PROGRAM REVIEW 1993: Self Study Report Department of Biometry

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Self Study Report
Department of Biometry

University of Nebraska-Lincoln
Executive Summary

The CSRS review team applauds the statistical expertise of the Biometry Department which began as the Statistical Laboratory in 1957 and culminated with the current academic Department of Biometry. This enhancement has been highlighted by a significant increase in the number of faculty and staff, the initiation of a Master of Science program, and the provision of graduate assistant stipends. With the presence of seven faculty, the imminent increase from seven to fifteen graduate students, the establishment of statistical consulting with numerous IANR faculty, and the diverse research and teaching expertise of the faculty, the department is poised to provide greater service to the University. Future goals may include: (1) establishment of a statistical department worthy of national recognition by joining the faculties of the Department of Biometry and the Division of Statistics from the Department of Mathematics and Statistics, and (2) the formation of a PhD program in Statistics that encompasses biometry and theoretical statistics.

It is apparent that the faculty is capable of conducting statistical research of a more theoretical nature. However, securing research grants as principal investigators or as co-investigators with other UNL faculty is required to fully support those research endeavors. With successful grant activity a greater portion of research results should be published in statistical journals.

Based on discussions, consultations on experimental design and data analysis are appropriate and much appreciated by IANR faculty. While personal consultations have been highly beneficial, the initiation of a "Help Desk" provides rapid and accurate response to straightforward statistical questions; thereby relieving the Biometry faculty for personal consultation on more complex statistical issues. The help desk provides valuable and "real world" training for graduate students.

Courses taught as a service to undergraduate and graduate IANR students appear to be appropriate in number and content. With a master's program successfully started, more formal policies for recruitment, selection, advising, and placement should be initiated. Further attention is required to provide space, computers, and advisers for graduate students.

Faculty expressed an appreciation for the strong support provided to Biometry by the administration from the Head, Deans, and Vice Chancellor. The team however, notes several management concerns including: the lack of faculty meetings; inadequate communications among Head, faculty, and graduate students; the need for continual curriculum improvement; and the lack of sufficient office and laboratory space. Concern is also raised about the potential over-commitment to international consulting at the expense of performing departmental functions.

The team is reluctant to recommend the immediate initiation of a PhD program in the Biometry Department. Establishment of a successful master's program before pursuing the doctoral program appears prudent. The merger of the two UNL statistical groups into one department would position UNL for a strong PhD program.
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Comprehensive Review Schedule

July 5-8, 1993

**Monday, July 5**
6:00 - 8:30 p.m.  Review team organizational meeting {Cornhusker}  
John Meadows

**Tuesday, July 6**
7:30 - 9:00 a.m.  Breakfast with IANR administration {ECU}  
David B. Marx
9:00 - 9:30  Break  
David B. Marx
9:30 - 11:00  Department overview {ECU}  
Eugene Boilesen
11:00 - 12:00  Departmental Professional Staff {ECU}  
Linda Pavlish
12:00 - 1:30 p.m.  Lunch {NCCE}  
David B. Marx
1:30 - 2:00  Faculty {ECU}  
Walt Stroup
2:00 - 2:30  Faculty {ECU}  
Linda Young
2:30 - 3:00  Faculty {ECU}  
Stephen Kachman
3:00 - 3:15  Break  
David B. Marx
3:15 - 4:15  Graduate Students {ECU}  
David B. Marx
4:15 - 4:45  Animal Science Department {ECU}  
David B. Marx
6:30 - 8:30  Dinner with faculty and administration {NCCE}  
David B. Marx

**Wednesday, July 7**
8:30 - 9:30 a.m.  Assoc. Vice Chancellor Academic Affairs {Adm}  
David Brinkerhoff
9:30 - 10:30  Dean College of Arts & Science {1206 OldH}  
John Peters
10:30 - 11:30  Math Department {827 OldH}  
Kent Eskridge
12:00 - 1:30 p.m.  Lunch with Department Heads {ECU}  
Carol Gotway
1:30 - 2:00  Faculty {ECU}  
Anne Parkhurst
2:00 - 2:30  Faculty {ECU}  
Leona Barratt
2:30 - 3:00  Faculty {ECU}  
Jon Borton
3:00 - 3:30  Support Staff {ECU}  
Donna Seefeld
3:30 - 4:00  Agronomy Department {ECU}  
John Meadows
4:00 - 5:30  Review team report preparation {ECU}  
John Meadows

**Thursday, July 8**
8:00 - 10:00 a.m.  Exit report to IANR administration {ECU}  
John Meadows
10:30 - Noon  Exit report to faculty {ECU}  
John Meadows
Dr. John Meadows
Cooperative States Research Service
U.S. Department of Agriculture
Washington, D.C. 20250-2200
Phone: 202.401.6602

Dr. Edward Gbur, Professor
Agricultural Statistics Lab.
University of Arkansas
Fayetteville, AR 71701-1201
Phone: 501.575.2448

Dr. Ramon Littell, Professor
Statistics Department
University of Florida
Gainesville, FL 32611-0327
Phone: 904.392.1941

Dr. George Milliken, Professor
Statistics Department
Kansas State University
Manhattan, KS 66506
Phone: 913.532.6883

Dr. Ed Clemens, Professor
Department of Animal Science
University of Nebraska-Lincoln
Lincoln, NE 68583-0908
Phone: 402.472.6219

Dr. Glenn Hoffman, Head & Professor
Biological Systems Engineering
University of Nebraska-Lincoln
Lincoln, NE 68510-0726
Phone: 402.472.1413

Ms. Valerie Karle, MS Candidate
Biometry Department
University of Nebraska-Lincoln
Lincoln, NE 68583-0712
Phone: 402.472-2903

Review Panel

Review Panel Chair

Dr. Edward Gbur, Professor
Agricultural Statistics Lab.
University of Arkansas
Fayetteville, AR 71701-1201
Phone: 501.575.2448

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Phone: 402.472.1413

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University of Nebraska-Lincoln
Lincoln, NE 68583-0712
Phone: 402.472-2903

UNL Academic Planning Committee Representative

IANR Representative

Graduate Student Representative
A. **INTRODUCTION**

This 1993 self-study report will build upon the most recent evaluation of the department done in 1985. The Department of Biometry continues to respond to the needs of the Institute of Agriculture and Natural Resources (IANR). However, with the development of a Masters degree program the department has become more diversified and acquired a broader perspective for its mission with IANR. We begin by reviewing the previous study and amplify the mission stated therein.

In 1985 a self-study and review of the programs of the Biometrics and Information Systems Center (BISC) was made. This report begins with a definition of Biometry which is instructive here: "Biometry is a subject matter discipline concerned with strategies for the observation of biological phenomena, and with designs for the collections of biological data and their subsequent statistical analysis and interpretation. Biometry, as a subject matter discipline, is a member of the area of statistics, much as agronomy is a member of the area of botany or animal science is a member of the area of zoology. Biometry is unique among the statistical sciences in that it involves the active practice of statistical design and analysis of biological research."

During the past four years the Department of Biometry has grown from four faculty to a total of six faculty and has become an academic department within IANR and UNL. The current graduate degree program in Biometry is


Breeding systems and techniques useful in population improvement programs and methods for predicting progress expected from each breeding system. Rockefeller Foundation sponsored class of international trainees from southeast Asia, Farm Suwan, Thailand, November 4, 1971.

Utilization of genetic variability induced by mutation breeding of cross fertilized plants. Mutation Breeding Workshop sponsored by the University of Tennessee Agricultural Experiment Station, United States Atomic Energy Commission, and the Southern Regional Education Board, Knoxville, TN, January 17-18, 1972.

The role of quantitative genetic investigations and the development of breeding procedures for the improvement of varieties, lines and hybrids in maize. International Center for Maize and Wheat Improvement, Mexico City, Mexico, April 11, 1972.

The role of quantitative genetic investigations and the development of breeding procedures for the improvement of varieties, lines and hybrids in maize. Graduate College, National School of Agriculture, Chapingo, Mexico, April 15, 1972.

Results of selection and breeding systems applied to a random mating population of corn. Seminar presented at University of Coahuilla, Saltillo, Mexico, April 18, 1972.


Development of random-mating populations and population improvement in sorghum through recurrent selection methods. International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India, April 15, 1975.

Population improvement in maize. International Maize Symposium, Genetics and Breeding '75, Urbana, IL, September 8-12, 1975.
needed not only by IANR and UNL, but by the State of Nebraska and our country. There are very few programs which offer degrees in Biometry especially with an emphasis in biological and agricultural statistical consulting.

Biometry is a dynamic field that is progressing at a rapid pace. The demand for state-of-the-art statistical advice is ever increasing as more and more biometrical applications in agriculture and the biological sciences become apparent. To meet the need for trained statistical consultants, the Department of Biometry offers a Master of Science degree in Biometry.

A biometrician must have knowledge of not only the latest theory and methodology in statistics, but must also become familiar with applications of statistics to subject matter in many areas. In addition, the biometrician must develop interpersonal skills so that technical expertise will be understood and used correctly. This program is designed to provide students with knowledge of statistical techniques and experience in handling both the technical and non-technical aspects of statistical consulting.

This is the second comprehensive review of this unit (the first being the 1985 self-study review of BISC) and will serve to clarify the expanding mission and goals of the department and to define a plan of action to meet those goals. We invite the review team to examine these goals and provide guidance in judging their merits and making recommendations on how to achieve them. The major goal is to allow our active faculty access to doctoral students and for them to have input into the program leading to the Ph. D. in Biometry.
B. PROGRAM GOALS AND RATIONALE

The mission of the Department of Biometry is to provide biometrical services to enhance the quality, credibility, and quantity of research conducted in the Institute of Agriculture and Natural Resources, to provide for the biometrical education of its students and in-service training of its staff, and to provide statistical data processing services in the support of teaching, research, and extension programs of IANR. The goals established to fulfill this mission are:

a. To facilitate the use of statistically sound and feasible research strategies beginning with the design and culminating with the analysis and report of the study and to develop creative applications of statistical design and analysis as required in IANR research.

b. To teach classes in biometry at both the undergraduate and graduate levels and to provide for continuing education of IANR staff to keep abreast of the latest advances in biometry.

c. To provide for professional growth and development of the members of the department and thereby enhance their effectiveness as members of the IANR faculty by giving them the opportunity and rewards of applying their skills creatively and encouraging the involvement of biometricians as full-fledged members of interdisciplinary research teams.
Isozyme patterns in original and selected populations of corn and sorghum and their possible use in plant breeding. Mid-America State Universities Association Honor Lectures presented by invitation at the following universities:
University of Missouri at St. Louis, March 7, 1983.
Kansas State University, March 23, 1983.
Oklahoma State University, March 28, 1983.

A quarter century of progress from mass selection in corn: Genetic studies involving original and improved populations. Mid-America State Universities Association Honor Lectures presented by invitation at the following universities:
University of Missouri at Columbia, March 8, 1993.
Iowa State University, March 14, 1983.
Kansas State University, March 22, 1983.
Oklahoma State University, March 27, 1983.
University of Nebraska, September 22, 1983.

Progress in yield improvement and changes in isozyme patterns in maize populations improved by mass selection. Central American cooperative Program for the Improvement of Food Crops, XXIX meeting, Panama City, Panama, April 8, 1983.

The mechanics of population improvement in sorghum. Sorghum Workshop, International Center for Maize and Wheat Improvement, El Batan, Mexico, April 14, 1983. (Presented by W.M. Ross, Senior author.)

Use of electrophoresis as a tool in maize and sorghum population studies. International Center for Maize and Wheat Improvement, El Batan, Mexico, April 15, 1983.

Some use of electrophoresis in maize population studies and maize breeding. School of Biological Sciences, University of Nebraska, Lincoln, NE, February 8, 1984.


Important considerations in planning an effective and efficient maize breeding program. Seminar given to trainees and staff, International Center for Maize and Wheat Improvement, El Batan, Mexico, February 14, 1986.

Recurrent selection for cold and freeze tolerance in maize (Zea mays L.) at the University of Nebraska. Invitation paper presented to staff and graduate students, Agricultural University, Peshawar, Pakistan and to personnel involved in TIPAN (Transfer and Integration of the Provincial Agricultural Network) project, USAID/University of Illinois, September 1, 1986.
d. To provide statistical data processing services for IANR by helping in the development of statistical computing hardware and software and providing continuing education in statistical computing for all faculty, staff and students.

e. To offer an advanced degree in biometry, including the involvement of students as intern consultants and TA's in biometry courses and to encourage students in other biological disciplines to pursue research into biometrical aspects of their major areas.

1. Undergraduate education

The teaching activities in the Department of Biometry consist of course offerings at the undergraduate and graduate levels and in-service training for IANR staff. The department offers no undergraduate degree and has no plans to offer one in the near future. Most employment opportunities for biometricians require a graduate degree. There is one undergraduate level course offered by the department which is used by many departments within IANR to fulfill a requirement for mathematics or statistics. This course gives the students a basic understanding of biometrical methods and the relation of statistics to biological systems. The enrollment for this course has remained high and more sections could be offered in the future.
2. Graduate education

The Department of Biometry currently offers fifteen graduate level courses ranging from a beginning graduate level survey course to advanced courses in biometrical theory. The latter courses are currently taken by both biometry majors and non-majors with a serious interest for statistical applications in their own discipline. The biometry department currently offers its graduate students the opportunity to participate in a two semester consulting sequence with a one semester course followed by a one semester practicum. All students take a group of six core courses (two of which are taught by the Mathematics and Statistics Department) and have as options courses taught in several other departments including Agronomy, Animal Science, Mathematics and Statistics, Industrial Engineering, and Educational Psychology, as well as Biometry. We feel that in order to continue to advance our own expertise in statistical methodology and to provide IANR with the highest level of statistical consulting possible, that a doctoral program is necessary for our department.


C. HISTORY

History of Biometrics and Information Systems Center

The nucleus of the present-day Department of Biometry was organized in 1957 under the directions of Dr. Charles Gardner, who held an academic appointment in Agronomy and also served as the Agricultural Experiment Station Statistician. This original administrative unit was called the Statistical Laboratory and was funded by the Agricultural Experiment Station to provide design, analysis, and data processing services to researchers. At that time the Statistical Laboratory did not have a teaching function. In 1968, Dr. Wilfred Schutz came to UNL to head the Statistical Laboratory. The staff at that time included one faculty member (Dr. Robert Mumm), a data processing programmer, a computer operator, data entry personnel and a secretary. Both faculty members (Schutz and Mumm) held academic appointments in Agronomy and taught the Agronomy courses in statistical methods and experimental design. The Statistical Laboratory moved to its present location in Miller Hall in 1970 and in 1972 the statistics courses were transferred from Agronomy to the Statistics Laboratory. Several new faculty were added to the staff during the next seven years in response to the growing demand for additional courses and consulting services. In 1978 the unit’s name was changed to the Biometrics and Information Systems Center (BISC). In 1987 BISC was divided into the Biometrics Center and the IANR...
Computing with separate heads and budgets. The Biometrics Center became the Department of Biometry in 1989 and all faculty from the previous Biometrics Center now hold academic appointments in that department.

1985 Program Review

A comprehensive review of the Biometrics and Information Systems Center occurred in 1985. In that self-study, assembled for that review, we recommended the establishment of a separate Department of Biometry and Information Processing Center. This has been accomplished. The second proposal was to establish a graduate degree program administered by the Department of Biometry. What we proposed in 1985 is now done - an M.S. in Biometry.

In the study plan the following highest needs were outlined:

a. form a Department of Biometry (accomplished, 1989)
b. establish a graduate degree program (accomplished in 1991)
c. the addition of 2.00 FTE’s (accomplished in 1990)
d. addition of four graduate assistant stipends
e. at least double the current space and facilities available in Miller Hall (accomplished in 1989)
f. addition of statistical programmers (one was added in September, 1989)
g. additional operating support for equipment, travel and software.

It is extremely pertinent to this document that the space needs were documented in this study plan in 1985. The plan was developed by administrators and statisticians from outside the department and university.

D. LOCATIONS AND FACILITIES

Miller Hall

All of the faculty offices and support staff offices are located in Miller Hall on East Campus. Total office space for eight faculty (including the Head) is approximately 717 sq. ft. Office space for five professional staff totals 448 sq. ft. There is also a small computer room for an Assistant Programmer and office space for two statistical programmers. These rooms in total occupy about 595 sq. ft. six graduate student assistants share three office areas. There are two reception areas for clerical staff and two conference/meeting rooms. At this time there is a great need for additional space to accommodate graduate students and meeting space for consulting. In the fall of 1993 we expect to have 15 graduate students in the Masters degree program. This sizeable increase from seven in the fall of 1992 will increase the need for more office space.
Given the visit by Physical Plant there may be serious health implications involved in adding to crowding given the fact that the ventilation system as is appears to be at most 60% adequate for the existing people.
E. ORGANIZATIONAL STRUCTURE

Administrative Structure for the University of Nebraska

The University of Nebraska system is comprised of four components, the University of Nebraska-Lincoln, and the University of Nebraska-Kearney, the University of Nebraska-Omaha, and the University of Nebraska Medical Center-Omaha. The chief executive officer for the entire system is the President. Each of the four major components is headed by a Chancellor. The Institute of Agriculture and Natural Resources is a separate component of the University of Nebraska-Lincoln. It is headed by a Vice Chancellor. The position is unique in the University in that it also is a Vice President in the University of Nebraska system and serves on the President's Executive Council with the four Chancellors.
Administrative Structure
University of Nebraska
University of Nebraska-Personnel

Board of Regents .............................................. Robert M. Allen
                        Don S. Blank
                        Nancy Hoch
                        Nancy L. O'Brien
                        John W. Payne
                        Margaret Robinson
                        Rosemary Skrupa
                        Charles S. Wilson

Corporation Secretary ..................................... James B. Milliken

Student Regents .............................................. Pamela Kohlmeier
                                                   Jennifer Newhouse
                                                   Andrew Sigerson
                                                   Andy Stock

President ....................................................... Martin A. Massengale

Executive Vice President and Provost ....................... Lee B. Jones

Vice President-Chancellor, University of Nebraska-Lincoln Graham B. Spanier

Vice President-Chancellor, University of Nebraska-Omaha Del D. Weber

Vice President-Chancellor, University of Nebraska-Medical Center Carol A. Aschenbrener

Vice President-Chancellor, University of Nebraska-Kearney William R. Nester

Vice President for Agriculture & Natural Resources
 & Vice Chancellor for IANR Irvin T. Omtvedt

Vice President for University Relations Lee O. Rupp

Interim Vice President for Administration James C. Van Horn

Vice President and General Counsel Richard R. Wood
Chancellor .................................. Graham B. Spanier
Associate to Chancellor ................. Herbert E. Howe, Jr.
Vice Chancellor for Research ............ William E. Splinter
Vice Chancellor for IANR ................ Irvin T. Omtvedt
Senior Vice Chancellor for Academic Affairs ........ Joan R. Leitzel
Vice Chancellor for Student Affairs ...... James V. Griesen
Vice Chancellor for Business and Finance .... John W. Goebel
Administrative Structure for the Institute of Agriculture and Natural Resources

The institute of Agriculture and Natural Resources is headed by a Vice Chancellor. Three major divisions of the Institute are the a) College of Agricultural Sciences and Natural Resources (teaching), b) Agricultural Research Division (research), and c) Cooperative Extension Division (extension) and each are headed by a Dean/Director. The other three components are headed by Deans and/or Directors - College of Human Resources and Family Sciences, International Programs Division, and Conservation and Survey Division. This figure shows the current organizational structure of IANR. Departments are administered by Heads who report to the respective Deans for each program area represented in the Department. Thus, the Head of the Department of Biometry reports to Dean Edwards for teaching and Dean Nelson for research.
Organizational Structure
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln

* Director of Agricultural Experiment Station
** Director of Cooperative Extension
### IANR Administrative Units

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<th>Academic Departments</th>
<th>Interdisciplinary Centers &amp; Programs</th>
<th>Primary Extended Campus Locations</th>
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<tr>
<td><strong>Agricultural Economics</strong></td>
<td>CENTER FOR ADVANCED LAND MANAGEMENT INFORMATION</td>
<td>AGRICULTURAL RESEARCH &amp; DEVELOPMENT CENTER - Mead</td>
</tr>
<tr>
<td>Sam M. Cordes</td>
<td>TECHNOLOGIES (CALMIT)</td>
<td>Dan Duncan</td>
</tr>
<tr>
<td>AGRICULTURAL LEADERSHIP EDUCATION &amp; COMMUNICATION</td>
<td>CENTER FOR BIOLOGICAL CHEMISTRY</td>
<td>NEBRASKA COLLEGE OF TECHNICAL AGRICULTURE</td>
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<tr>
<td>Allen G. Blezek</td>
<td>Marion O'Leary</td>
<td>- Curtis</td>
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<tr>
<td>AGRICULTURAL METEOROLOGY</td>
<td>CENTER FOR BIOTECHNOLOGY</td>
<td>NORTHEAST RESEARCH &amp; EXTENSION CENTER - Concord</td>
</tr>
<tr>
<td>Blane L. Blad</td>
<td>Donald P. Weeks</td>
<td>Robert D. Fritsch</td>
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<tr>
<td>Agronomy</td>
<td>CENTER FOR LEADERSHIP DEVELOPMENT</td>
<td>PANHANDLE RESEARCH &amp; EXTENSION CENTER</td>
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<tr>
<td>Robert C. Shearman</td>
<td>Allen G. Blezek</td>
<td>Burton A. Wechtenhal</td>
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<tr>
<td>Animal Science</td>
<td>CENTER FOR RURAL COMMUNITY</td>
<td>Interim</td>
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<tr>
<td>Elon D. Aberle</td>
<td>REVITALIZATION &amp; DEVELOPMENT</td>
<td>SOUTH CENTRAL RESEARCH &amp; EXTENSION CENTER</td>
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<tr>
<td>Biochemistry</td>
<td>Sam M. Cordes</td>
<td>- Clay Center</td>
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<tr>
<td>Marlon H. O'Leary</td>
<td>CENTER FOR SUSTAINABLE AGRICULTURE</td>
<td>Charles L. Stonecipher</td>
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<tr>
<td>Biological Systems ENGR.</td>
<td>AGRICULTURE</td>
<td>SOUTHEAST RESEARCH &amp; EXTENSION CENTER - Lincoln</td>
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<tr>
<td>Glenn J. Hoffman</td>
<td>Charles A. Francis</td>
<td>Loyd L. Young</td>
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<tr>
<td>Biometry</td>
<td>CENTER FOR WATER AND ENVIRONMENTAL PROGRAMS</td>
<td>WEST CENTRAL RESEARCH &amp; EXTENSION CENTER</td>
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<tr>
<td>David B. Marx</td>
<td>COMMUNICATIONS &amp; COMPUTING SERVICES</td>
<td>- North Platte</td>
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<tr>
<td>Entomology</td>
<td>T.E. Hartung</td>
<td>Pete Jacoby</td>
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<tr>
<td>John E. Foster</td>
<td>FOOD PROCESSING CENTER</td>
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<tr>
<td>Family &amp; Consumer Sciences*</td>
<td>Stephen L. Taylor</td>
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<tr>
<td>Shirley L. Taylor</td>
<td>INDUSTRIAL AGRICULTURAL PRODUCTS CENTER</td>
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<tr>
<td>Food Science &amp; Technology</td>
<td>Milford A. Hanna</td>
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<td>Stephen L. Taylor</td>
<td>NEBRASKA FOREST SERVICE</td>
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<tr>
<td>Forestry, Fisheries &amp; Wildlife</td>
<td>Gary L. Hergenrader</td>
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<td>Gary L. Hergenrader</td>
<td>NEBRASKA STATEWIDE ARBORETUM</td>
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<tr>
<td>Horticulture</td>
<td>Paul Read</td>
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<td>Paul E. Read</td>
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<tr>
<td>Nutritional Science &amp; Dietetics*</td>
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<td>Marilyn Schnepf</td>
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<td>Plant Pathology</td>
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<td>Anne K. Vidaver</td>
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<tr>
<td>Textiles, Clothing &amp; Design*</td>
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<td>Rita C. Kean</td>
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<tr>
<td>Veterinary &amp; Biomedical Science</td>
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<tr>
<td>John A. Schmitz</td>
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</tbody>
</table>

*Includes only extension and research programs in IANR.
F. CURRENT DEPARTMENT OF BIOMETRY

The Department of Biometry was approved by the Regents of the University of Nebraska in June of 1989. The Masters degree was approved about a year later. The department now has a total of seven faculty, (including Department Head) and five support staff. Currently we have eight graduate students with an increase for the fall of approximately seven more. The department currently offers seven course selections every semester with a total of eighteen different courses being offered over a two to three year span.
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<th>FACULTY</th>
<th>ADMIN.</th>
<th>TEACHING</th>
<th>RESEARCH</th>
<th>REVOLVING</th>
</tr>
</thead>
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<tr>
<td>Eskridge, Kent</td>
<td></td>
<td>.40</td>
<td>.60</td>
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<tr>
<td>Gotway, Carol</td>
<td>.35</td>
<td>.65</td>
<td></td>
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<tr>
<td>Kachman, Steve</td>
<td>.25</td>
<td>.75</td>
<td></td>
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<tr>
<td>Marx, David</td>
<td>.60</td>
<td>.20</td>
<td>.20</td>
<td></td>
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<tr>
<td>Parkhurst, Anne</td>
<td>.50</td>
<td>.50</td>
<td></td>
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<tr>
<td>Stroup, Walter</td>
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<td>.50</td>
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<tr>
<td>Young, Linda</td>
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<td>.75</td>
<td></td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>.60</td>
<td>2.45</td>
<td>3.95</td>
<td>.0</td>
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</table>

| PROFESSIONAL STAFF    |        |          |          |           |
| Boilesen, Eugene      |        |          | 1.00     |           |
| Pavlish, Linda        |        |          | .76      | .24       |
| **TOTAL**             | .0     | .0       | 1.76     | .24       |

| TECHNICAL STAFF       |        |          |          |           |
| Barratt, Leona        |        |          | .20      | .80       |
| Frenzel, Joan         |        |          | .25      |           |
| **TOTAL**             | .0     | .0       | .20      | 1.05      |

| SECRETARIAL STAFF     |        |          |          |           |
| Borton, Jon           | .50    | .50      |          |           |
| Seefeld, Donna        | .50    | .50      |          |           |
| **TOTAL**             | .0     | 1.00     | 1.00     |           |

| GRAND TOTAL           | .60    | 3.45     | 6.91     | 1.29      |
### Department of Biometry
### Appropriated Budget Support
(Excluding fringe benefits)
1988-1993

<table>
<thead>
<tr>
<th>Program</th>
<th>Year</th>
<th>Faculty</th>
<th>Graduate Assistant</th>
<th>Support Staff</th>
<th>Operating</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1988-89</td>
<td>123,880</td>
<td>6,740</td>
<td>61,203</td>
<td>11,505</td>
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<td>1989-90</td>
<td>138,079</td>
<td>7,443</td>
<td>65,568</td>
<td>14,455</td>
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<td>1990-91</td>
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<td>8,213</td>
<td>70,931</td>
<td>14,455</td>
<td>279,342</td>
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<td>1991-92</td>
<td>245,869</td>
<td>8,213</td>
<td>73,765</td>
<td>14,455</td>
<td>342,302</td>
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<td>1992-93</td>
<td>261,495</td>
<td>18,213</td>
<td>76,398</td>
<td>23,255</td>
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<td>14,510</td>
<td>7,680</td>
<td>158,587</td>
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<td>1990-91</td>
<td>173,462</td>
<td>15,253</td>
<td>18,288</td>
<td>7,680</td>
<td>214,683</td>
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<td>1991-92</td>
<td>155,376</td>
<td>15,863</td>
<td>19,019</td>
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<td>1992-93</td>
<td>181,640</td>
<td>15,863</td>
<td>19,327</td>
<td>7,680</td>
<td>224,510</td>
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<td>Teaching</td>
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</tr>
<tr>
<td></td>
<td>1988-89</td>
<td>247,759</td>
<td>19,258</td>
<td>75,713</td>
<td>19,185</td>
<td>361,915</td>
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<td>1989-90</td>
<td>291,982</td>
<td>21,267</td>
<td>81,721</td>
<td>22,135</td>
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<td></td>
<td>1990-91</td>
<td>359,205</td>
<td>23,466</td>
<td>89,219</td>
<td>22,135</td>
<td>494,025</td>
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<td></td>
<td>1991-92</td>
<td>401,245</td>
<td>24,076</td>
<td>92,784</td>
<td>22,135</td>
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<td></td>
<td>1992-93</td>
<td>443,135</td>
<td>34,076</td>
<td>95,725</td>
<td>30,935</td>
<td>603,871</td>
</tr>
</tbody>
</table>

Totals 1988-1993
## Department of Biometry
### Research Revolving Budget Expenditures
*(Excluding fringe benefits)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Faculty</th>
<th>Graduate Assistant</th>
<th>Support Staff</th>
<th>Operating</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-1989</td>
<td>.0</td>
<td>.0</td>
<td>34,571</td>
<td>2,100</td>
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<td>1989-1990</td>
<td>.0</td>
<td>.0</td>
<td>31,086</td>
<td>.0</td>
<td>31,086</td>
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<td>.0</td>
<td>39,272</td>
<td>.0</td>
<td>39,272</td>
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<tr>
<td>1991-1992</td>
<td>.0</td>
<td>.0</td>
<td>40,100</td>
<td>500</td>
<td>40,600</td>
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<tr>
<td>1992-1993</td>
<td>.0</td>
<td>.0</td>
<td>22,453</td>
<td>900</td>
<td>23,353</td>
</tr>
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</table>
ANALYSIS OF FISCAL YEAR 1993 RESEARCH BUDGET FOR THE DEPARTMENT OF BIOMETRY

Listed below are research budget data for the Department of Biometry and the average of all units in the Agricultural Research Division for fiscal year 1993. The base data included in the calculations were budgeted faculty and support staff FTE. Revolving, grant, and contract funds are not included, nor are funds for diagnostic laboratory activities.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Department of Biometry</th>
<th>ARD Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty research FTE</td>
<td>3.95</td>
<td>6.26</td>
</tr>
<tr>
<td>Faculty salary, $/FTE</td>
<td>58,910</td>
<td>63,045</td>
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<tr>
<td>Manager/Prof. employ., fte/FTE</td>
<td>0.45</td>
<td>0.61</td>
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<tr>
<td>Manager/Prof. salary, $/FTE</td>
<td>12,927</td>
<td>15,914</td>
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<tr>
<td>Office/service employ., fte/FTE</td>
<td>0.37</td>
<td>1.00</td>
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<tr>
<td>Office/service salary, $/FTE</td>
<td>6,414</td>
<td>20,788</td>
</tr>
<tr>
<td>GRA salary, $/FTE</td>
<td>5,877</td>
<td>9,524</td>
</tr>
<tr>
<td>Hourly employee wages, $/FTE</td>
<td>-0-</td>
<td>1,429</td>
</tr>
<tr>
<td>Fringe benefits, $/FTE</td>
<td>18,097</td>
<td>22,033</td>
</tr>
<tr>
<td>Operating, $/FTE</td>
<td>6,141</td>
<td>21,433</td>
</tr>
<tr>
<td>Total support, $/FTE</td>
<td>49,456</td>
<td>91,120</td>
</tr>
<tr>
<td>Total investment, $/FTE</td>
<td>108,366</td>
<td>154,165</td>
</tr>
<tr>
<td>Total investment rank in 20 units</td>
<td>19</td>
<td>----</td>
</tr>
</tbody>
</table>

Please note that all data are normalized to faculty research FTE in the unit to allow comparison of support across all units. Differences in support among units are due to many factors including differential cost of research in varying disciplines and historical factors. Some of the historical factors are long-term unit productivity and decisions on the nature of budget reductions taken in previous years. For example, some units elected to cut operating, GRA stipends and support staff rather than faculty FTE during the 1980’s and the current biennium. On the other hand, some units have volunteered to give up faculty FTE to gain additional operating and support staff.
ESKRIDGE, Kent M., Associate Professor
  B.S. 1976, University of Missouri
  B.A. 1976, University of Missouri
  M.A. 1981, University of Missouri
  Ph.D. 1987, University of Nebraska

  Decision analysis, design of experiments, and biological modeling.

  60% Research, 40% Teaching, initial appointment 1987.

  Graduate Faculty Fellow

GARDNER, Charles O., Emeritus Professor
  B.Sc. 1941, University of Nebraska
  M.B.A. 1943, Harvard University
  M.S. 1948, University of Nebraska
  Ph.D. 1951, North Carolina State University

  Quantitative genetic traits, statistical genetic models, recurrent
  selection studies, prediction equations

  Graduate faculty fellow.

GOTWAY, Carol A., Assistant Professor
  B.S. 1984, Bradley University
  B.S. 1984, Bradley University
  M.S. 1986, Iowa State University
  Ph.D. 1989, Iowa State University

  Stochastic simulation, spatial statistics, and geostatistics.

  65% Research, 35% Teaching, initial appointment 1992.
JOHNSON, Blaine E., Courtesy Professor
B.S. 1971, University of Nebraska
M.S. 1973, Oregon State University
Ph.D. 1986, University of Nebraska
Graduate Faculty Fellow

KACHMAN, Stephen D., Assistant Professor
B.S. 1981, Michigan State University
M.S. 1986, University of Illinois
Ph.D. 1988, Montana State University
Mixed linear models, breeding and genetics.
75% Research, 25% Teaching, initial appointment 1990.
Graduate Faculty Member

MARX, David B., Professor and Head
B.A. 1968, College of Wooster
M.A. 1970, University of Missouri
Ph.D. 1977, University of Kentucky
Administrative Head, spatial variability, design of experiments, linear models, and geostatistics.
60% Administrative, 20% Research, 20% Teaching, initial appointment 1989, tenure 1989.
Graduate Faculty Fellow

PARKHURST, ANNE M., Professor
B.A. 1962, University of Virginia
M.S. 1965, Yale University
Ph.D. 1992, University of Nebraska
Chaos-modeling dynamic biological systems, multivariate analysis, and time series analysis.
50% Research, 50% Teaching, initial appointment 1972, tenure 1979.
Graduate Faculty Fellow
SCHUTZ, Wilfred, M., Professor
B.S. 1957, University of Nebraska
M.S. 1959, University of Nebraska
Ph.D. 1962, North Carolina State University
Graduate Faculty Fellow

STROUP, Walter W., Professor
B.A. 1973, Antioch College (Ohio)
M.S. 1975, University of Kentucky
Ph.D. 1979, University of Kentucky
Design of experiments, generalized linear models, and statistical practice in developing countries.

50% Research, 50% Teaching, initial appointment 1979, tenure 1986.
Graduate Faculty Fellow

YOUNG, Linda J., Associate Professor
B.S. 1974, West Texas State University
M.S. 1976, West Texas State University
Ph.D. 1981, Oklahoma State University
Sampling, biological modeling, statistical inference, and statistical ecology.

75% Research, 25% Teaching, initial appointment 1990, tenure 1990.
Graduate Faculty Fellow.
The highest priority for the Department of Biometry is a Ph.D. program.

During the past several years, the department has progressed from being a primarily service unit with four faculty, to a multi-faceted academic department with seven faculty, all of whom have active research interests. A M.S. program was established in 1991. The logical next step is a Ph.D. program. The benefits of a Ph.D. program are numerous.

a. Enhanced recruiting of graduate students. Good graduate students are more likely to be interested in a program which offers the possibility of continuing for a Ph.D, rather than a terminal M.S. program.

b. Enhanced ability to do research. All of the Biometry faculty have more statistical problems suggested by their consulting than they can possibly address on their own. Many faculty will tell you that they have problems which have "gathered dust" for years. With good Ph.D. level graduate students, these problems stand a better chance of being addressed.

c. Enhanced consulting. This occurs on two ways. The first is related to the point just made. Many consulting problems raise novel statistical questions for which there is no established standard approach. Finding a good approach often involves research. Graduate students can greatly
extend our ability to provide good statistical approaches for novel problems. The second way is that advanced graduate students can do routine statistical consulting on their own. This improves everybody's access to statistical consulting and frees the faculty to concentrate on more difficult consulting problems. In Spring semester, 1993, Biometry instituted a "Help Desk" staffed by a graduate student. The response has been very good; she has been very busy with a variety of problems.

Enhanced teaching. Biometry has a number of classes with labs. We are constantly struggling to place graduate students with an appropriate background as lab instructors. For example, our M.S. students are required to take BIOM 802 (Experimental Design), which has a lab. They cannot teach the lab until they have had the course themselves. Many universities have open statistical help labs, many with computers, where students come to do assignments or work on data analysis. These labs are typically staffed by advanced graduate students who can field a variety of questions. M.S. level graduate students lack the maturity and breadth of statistical background to be effective in such situations. In general, Ph.D. level graduate students can make a variety of contributions to the teaching program that faculty do not have the time to make and M.S. students lack the background to make.
e. Enhanced professional development opportunities for faculty. With the ability to concentrate on "quality not quantity" in consulting, and with the ability to work with graduate students on research problems, and with graduate students able to handle some of the more mundane tasks, the "breathing space" required for faculty to take advantage of professional development opportunities is greatly improved.

Enhanced value of Biometry to IANR, UNL, and Nebraska. In addition to improving Biometry's ability to fulfill its teaching-research-consulting mission, a Ph.D. program benefits the university and the state in additional ways. The impact of W. Edwards Deming, the guru of statistical process control and "Total Quality Management," on Japan and, more recently, on the U.S., clearly demonstrate the capacity of a strong statistics program to contribute to economic prosperity. A Ph.D. program would put Biometry in a position to make meaningful contributions to Nebraska's future. Moreover, it would provide a pool of qualified graduates to Nebraska employers.

Historically, there have been a number of attempts to start a Ph.D. program in statistics involving the Biometry faculty. In the early 1970's, there was a discussion of an area program in statistics involving the statistical faculty from the Department of Mathematics, the Biometrics Center (now the Department
of Biometry), the Department of Educational Psychology, and other departments having faculty statisticians. In 1985, a committee was formed to study the feasibility of combining the statistical faculty of the Department of Mathematics & Statistics and the Biometrics Center into a Department of Statistics. In 1991, the faculties of the Math & Stat Department’s Division of Statistics and the Department of Biometry signed a petition to the Dean’s supporting, in principle, a combined Department of Statistics. At that time, there was also discussion of an area program in statistics and of adding a Biometry option to the existing Ph.D. program in Mathematics and Statistics. For various reasons, none of these initiatives has gone anywhere.

In theory, there are several ways in which Biometry participation in a Ph.D program could occur.

a. A stand alone Ph.D. program in Biometry.

b. An area program in "Quantitative Studies" involving faculty from Biometry, Plant and Animal Genetics, Quality Control (in Food Science & Technology and Biological Systems Engineering), Econometrics, and Environmental and Ecological Studies.
c. Allow the Biometry faculty to be advisors to Ph.D. students in Mathematics and Statistics.

d. An area program in Statistics involving, primarily, the faculty of the Math & Stat Department's Division of Statistics and the Biometry Department. Interested faculty from other departments could also participate.

e. An area program similar to (d) but also involving separating the Division of Statistics into a stand-alone department in Arts & Sciences.

f. A Department of Statistics combining the Division of Statistics and Biometry. Faculty from other departments might have joint or courtesy appointments.

The small faculty sizes and fiscal reality probably rule out options (a) and (e). In addition, a stand-alone Biometry Ph.D. program would be weaker academically than one which draws on all the statistical resources at UNL. To a lesser extent, this would also be true of option (b). Option (c) might be acceptable on a short-term, transitional basis (i.e., assuming a commitment was made to establish a statistics department, until the department came into official
existence). However, it allows the Biometry faculty no input into curriculum
decisions nor participation in teaching core courses. The best one can say about
this arrangement is that it hampers effective advising and discourages recruiting
graduate students. Thus, option (c) is not an acceptable solution. This leaves
options (d) or (f). Both of these draw on the combined expertise of all UNL
statistics faculty. Both involve all faculty in teaching, advising, and curriculum
decisions. Both allow streamlining core courses with resulting economies of
scale. Both have stalled in the past because of several issues, the main ones
being location (City or East Campus) and tenure and promotion criteria.
However, the Biometry faculty are open to either.

To repeat, the establishment of a Ph.D. program is our highest
priority, and we are open to any reasonable means of obtaining that end,
including alternatives not listed above.

Future Requirements and Challenges Facing Biometry

As stated earlier, with faculty, trained graduate students, support staff, and
teaching loads at current levels, Biometry can sustain the following activities:

1. Involvement in a limited number of collaborative research projects (at
   most 5-10 per faculty member, perhaps less depending on complexity).

2. Limited advisory consulting. Each teaching faculty can afford a maximum
   of 10 contact hours a week for all consulting. Subtract what is taken by
   collaborative research and whatever is left is available for advisory
consulting. This time includes participation on project reviews. Whenever demand for this activity is particularly heavy, available contact time is further reduced.

3. Tutorial activity in the form of perhaps one seminar per semester, presented either at the department, IANR, or professional society level. These may lead to intermittent publication.

4. Consulting and/or teaching loads have been reduced since 1989, allowing for innovative activity in Biometry documented by publication. However, the department cannot sustain an increase in these areas without hindering our professional development. This development would greatly be enhanced by the addition of a Ph.D. program.

With current staff and teaching commitments, any expansion of services is not reasonable. Any increase in one form of consulting or research activity will require either an increase in consulting resources or a reduction in some other activity. Yet the demand for statistical consulting and collaborative research is extensive at IANR. Any compromise in the quality of service provided by Biometry would translate as an immediate loss in the quality and quantity of research possible at IANR. As mentioned earlier in this report, it is extremely difficult to achieve excellence in teaching, collaborative research, advisory consulting, basic methodological research, etc. simultaneously. The goals are
often mutually exclusive. This expectation is even less feasible without a sufficient number of graduate students and/or ample technical assistance.

The challenge Biometry faces is how to 1) maintain the quality of the services it presently provides, 2) make these services available to researchers who are currently frustrated by Biometry's limited resources, and 3) develop a nationally recognized Biometry program. There are three choices: 1) maintain the status quo; 2) maintain the program as is but add staff; 3) expand the program by adding a Ph.D degree program, either with or without a joint department of statistics.

Maintaining the status quo will result in a decline of the quality of Biometry services. The decline will occur because of professional stagnation and because of exhaustion. Biometry faculty can only respond to a finite number of requests for their services. They are currently at that limit. Moreover, much of the service requested is of a technical nature. Faculty have been trained to be creative and have entered the academic profession with the opportunity for creativity as a primary attraction. The most effective role for a faculty level biometrician is one which encourages this creativity. Yet much of what Biometry faculty actually do is mundane. This is because the mundane aspects of consulting are of more short-term urgency. If an MS candidate has to graduate next week and can't remember the interpretation of an orthogonal contrast, Biometry faculty have to drop what they are doing to answer that question. Any
experienced Ph.D. graduate student in Biometry could answer such a question with equal competence (and considerably more patience under the circumstances!) but Biometry faculty must do it instead because there is no one else. Inevitably, the mundane aspects crowd out the creative. It is cavalier to expect Biometry faculty simply to say "no." Failure to provide this is contrary to the department's mission and will disenfranchise clientele. Moreover, the mere act of having to say "no" often and repeatedly is itself destructive to creative energy. However, not saying "no" to a large number of consulting requests is also destructive to creativity. Thus, one way or another, the status quo guarantees the erosion of Biometry services.

Biometry has added staff without altering the structure of its program in the past. The effect has consistently been to increase demand so that the per capita workload has actually increased and the problem of creative paralysis has remained unsolved. A partial solution would be to add technicians to assist in consulting. However, there is really limited incentive for such positions. The university cannot pay salaries competitive with what these individuals could get in private industry. Without a Ph.D. there is little opportunity for such individuals to advance within the university system. Without the possibility of earning a Ph.D. degree in Biometry, there is little to keep such individuals long enough to become accomplished consultants. Moreover, investment in technicians is a nearsighted approach. They must be paid far more than graduate assistants, they will become restless and move on, and they will have to be replaced.
Without a Ph.D. degree program, where do the replacements come from?

The third alternative is to initiate a Ph.D. degree program. The effect of this on the stimulation of faculty creativity is obvious. Ph.D. graduate assistants would allow faculty to pursue their creative interests in Biometry while dramatically extending the quantity of advisory consulting services Biometry could provide. Graduate assistants bring a level of enthusiasm into mundane consulting that faculty have long since lost; in this sense they are actually more effective than faculty at this level. This would free faculty for the more creative and complex issues of research consulting, further enhancing the quality of services provided.

A graduate Ph.D. program in Biometry is not a panacea. Workload will still be heavy. New problems will arise. Many statistics departments have tended to become increasingly theoretical and divorced from their original mission. This is a danger against which this department would have to be wary. It is well to realize, however, that many times the problem is not the amount of work but the kind of work. If the work has become repetitive and lost its challenge and there is a lot of it, that is a more difficult situation than if there is a lot of work to do and much of it has never been done before.
II. PROGRAM ACTIVITIES

THE RESEARCH AND CONSULTING PROGRAM

Personnel

Faculty:

Eskridge, Kent
Gotway, Carol
Kachman, Steve
Marx, David
Parkhurst, Anne
Stroup, Walt
Young, Linda

Professional Staff:

Boilesen, Eugene
Pavlish, Linda

Graduate Students:

Bazubwabo, Jean Pierre
Karle, Valerie
Gardner, Chuck
Gibson, Ann
Haderbach, Driss
Milliken, April
Yuelong Yang
ABSTRACT

Research activities of the Department of Biometry include statistical consulting, participation by staff as collaborators in Experiment Station research, innovation of new biometrical and statistical methods, adaptation of existing statistical theory and methods to novel experimental situations, investigation of the suitability of biometrical practices for various research applications, and the monitoring of the statistical quality of Experiment Station research. These activities are quite diversified compared to the original activities of the Statistics Laboratory, the unit upon which the current Department of Biometry is based. Reasons for this diversification are 1) increased realization of the importance of statistically sound design as a prerequisite to analysis, 2) increased emphasis by subject matter journals on proper use of statistics in published research, and 3) increased availability and diversity of statistical computing packages. The nature of statistical consulting has changed; there is far less emphasis on post-experiment data processing and interpretation and far more emphasis on creative input into all phases of Experiment Station research projects. There is more appreciation for the biometrician as fellow scientist and scholar rather than as mere technician. In terms of the magnitude and variety of its contributions to the quality of Experiment Station research and the extent to which it has been able to raise the
statistical consciousness of IANR researchers, the Department of Biometry is a spectacular success.

There are, however, serious problems. The most obvious problem is that the success of the department has created a severe imbalance between the demand for statistical services and the department’s ability to deliver. The second problem, less obvious, but in the long run more serious, is the lack of a Ph. D. degree program in biometry and the effect this has on research activities of the department. Between the lack of graduate student research assistants and the heavy workload, Biometry Department faculty are not in a position to respond effectively to IANR research projects which raise non-routine statistical problems requiring creative solutions. Moreover, technical support is commonly provided by graduate students; it serves as valuable practical education for them and relieves faculty of the mundane details of consulting. Without it, faculty are required to respond to IANR consulting demands, major or minor. This is taxing, disruptive to creative efforts, and thus further dilutes the quality of the services available. Furthermore, the expectation of indiscriminate consulting activity (and the suppression of creative energy which is its inevitable consequence) is not a wise use of faculty. The "help desk" instituted in 1993 has proved a success and will be enhanced with a Ph.D. program.

The purpose of this section is to clarify the goals of the research component of the Department of Biometry, to review the history of its activities, to assess the current state of the department, and to make recommendations for
THE RESEARCH AND CONSULTING PROGRAM

Introduction

Consistent with the mission of this department, the Department of Biometry's involvement in research is focused on insuring the proper implementation of biometry in IANR projects from initial design through publication and developing a nationally recognized Biometry program. Four specific activities are necessary to fully accomplish this mission. They are defined as follows:

1. **Collaborative research** is activity in which the biometrician participates as a member of the research team. The biometrician is responsible for all statistical aspects of the research. This activity usually leads to junior authorship in a journal appropriate for the primary subject matter of the research. Under faculty supervision, advanced Biometry Ph.D. graduate assistants could be involved in collaborative research.

2. **Advisory consulting** is activity whose purpose is to resolve specific questions with regard to a research design or data analysis. The biometrician provides an opinion or suggests a direction but is not systematically involved in the research. This activity rarely leads to publication. Participation in Experiment Station
project reviews is one of the activities associated with advisory consulting. Trained Biometry Ph.D. students could provide substantial support in advisory consulting. (except in project reviews)

3. **Tutorial activity** is defined as the presentation or publication of statistical philosophy or methodology for an audience principally composed of non-statisticians. The subject matter need not be original from a statistical viewpoint. The purpose is to make researchers aware of state-of-the-art statistical practices or of perceived abuses of statistical methodology in their discipline.

4. **Development of novel or innovative applications in Biometry** is activity which includes the development of a novel design or analysis, a novel application of existing theory or methods, or a study of the advantages and disadvantages of a design or method of analysis. Biometry Ph.D. students clearly would stimulate and broaden faculty productivity in this area.

These activities are listed in order of importance with respect to the mission of the Department of Biometry, that is, to provide statistical support for IANR research. Since each of these four activities are essential, ideal Biometry Department would treat all four with equal priority. However, with limited resources, this is not possible.

To understand the ranking of these priorities, it is necessary to understand the dilemma faced by practicing biometricians in the academic world. To understand the challenges faced by the Department of Biometry in the future, it
is essential to understand the risks invited by the underemphasis of any of these activities.

Like any member of the academic profession, a biometrician must show evidence of productivity. This evidence is usually in the form of journal articles. In general, the two means by which a biometrician publishes are collaborative research or development of novel applications. Unfortunately, unless the consulting load is kept very small, these activities are mutually exclusive. Collaborative research demands extensive knowledge of non-statistical subject matter and interaction with members of the research team, whereas the development of novel applications demands intensive knowledge of statistical theory as well as the time, space, and solitude typical of creative activity. Given that the Department of Biometry exists to serve a very large demand for statistical services, members of the department staff must necessarily choose to emphasize consulting activities, which means that for professional survival, collaborative research has top priority.

There is further logic to assigning top priority to collaborative research in addition to the need for publication. It is the best way to insure proper design, analysis, and interpretation since it requires the biometrician's involvement throughout the research project.

Advisory consulting is also important. Many researcher's needs are not extensive enough to justify the involvement of a biometrician on a full-time basis. However, many advisory consulting activities amount to nothing more than
resolving quick and often basic questions. There is a danger in this type of consulting. Questions are often presented out of context of the research problem, thus increasing the likelihood of an inappropriate answer. The biometrician with a large advisory consulting load cannot possibly have complete familiarity with every experiment and thus some advice is bound to be superficial. Collaborative research alleviates this problem. Moreover, most advisory consulting questions do not require faculty level expertise to answer; they could be easily handled by support staff or graduate assistants. It is important that a small faculty be protected from an excessive amount of this activity to allow them to concentrate their efforts on the aspects of consulting, research, and teaching which require their creativity and expertise.

The state of the art in biometry is rapidly evolving. To ensure that IANR researchers are using the most refined statistical tools available, tutorial activity is vital. Much informal tutorial activity occurs in the process of collaborative research and advisory consulting. Nonetheless, there is a need for formal tutorial activities so that researchers whose current activity does not lend itself to contact with the Department of Biometry may be exposed to recent developments in biometry. Moreover, Biometry Department faculty have an obligation to share their insights via publication with the scientific community at large.
Historical Background of the Research and Consulting Program

The Department of Biometry originated as a Statistical Laboratory, or "Stat Lab." with close ties to the Agronomy Department. The Stat Lab had its roots in the concept of the "experiment station statistician." Researchers brought their data to the Stat Lab where experts in statistical computing performed the analysis and helped the researcher interpret these computations. In its time, the experiment station concept made sense. Computers and calculators were very difficult to operate and few researchers had the time or the training to cope with this task. Furthermore, few researchers had a need for the Stat Lab's services. With a small clientele, there was plenty of time to spend in depth with each research project. Thus, at its inception, the Stat Lab was involved primarily in service consulting, a combination of advisory consulting and data processing.

Throughout the 1970's, the Stat Lab, which became the Department of Biometry, shifted its focus away from purely service consulting to a greater variety of activities. There were a number of reasons for this change. First, statistical computing packages not requiring computing expertise (e.g., SAS and SPSS) became available. Thus, it became possible for researchers to assume responsibility for much of their data processing. Second, experiment station statisticians did a very effective job convincing the agricultural academic community of the need for formal statistical analysis and, indeed, for carefully planned experimental design. This was true not just in Agronomy, but to varying degrees in all agricultural and home economics disciplines. The requirement of
statistical rigor in agricultural research became virtually universal. These changes led to a greatly increased demand for consulting services and to a greatly increased variety of consulting problems. Proper statistical practice was elevated to a high priority by the Experiment Station and it became a requirement for each research project review team to include a Biometry staff member. Furthermore, Biometry became the computer program debugging center of East Campus. As SAS came into common use, researchers would frequently attempt to design and analyze their own experiments with little input from Biometry. However, many researchers proceeding in this fashion found it necessary to obtain the assistance of Biometry to write or help debug a SAS program. Quite often, this process revealed flawed designs or inappropriate analysis strategies. Both project reviews and debugging experience reinforced the concept that the best time to see a statistician is before collecting any data. This further contributed to the demand for statistical consulting.

During the latter 1970’s the nature of research at the Department of Biometry further changed character as collaborative research and tutorial activities became more commonplace. This resulted partly from the recognition that the biometrician’s most important contribution comes at the design phase of the research and partly from increasing pressure for Biometry faculty members to document their productivity through publication. Advisory consulting which concentrated on data analysis and the project review process both revealed a need for biometricians to be more involved at all phases of research. To accomplish
this, two strategies were adopted. First, members of the Biometry faculty served as members of graduate student supervisory committees. Second, some Experiment Station scientists chose to include Biometry staff members as cooperators on their projects. Sometimes these relationships were initiated as a result of the research involving a difficult biometrical problem in which the Biometry member was interested, and sometimes they simply arose from a desire to work with a statistical advisor even though the requirements of the project were routine. Toward the end of the 1970's this type of consulting relationship assumed more urgency, particularly for the younger Biometry faculty, as increased emphasis was placed on publication as a criterion for the professional advancement of the Biometry faculty.

The increase in emphasis on publication fundamentally altered the nature of the department. Formerly, there was an explicit understanding that Biometry faculty were not expected to publish. However, since a certain number of publications were required for membership on the graduate faculty and since this was required for membership on graduate supervisory committees, there was always subtle pressure to publish. Until the late 1970's, publications were not an important criterion for promotion, tenure, etc. for Biometry faculty. In 1980, this formally changed.

The increased emphasis on publication created problems for Biometry faculty. Unlike most IANR faculty with research appointments, research for Biometry faculty meant service, primarily in the form of advisory consulting.
Thus, Biometry faculty often found themselves in the bind of being employed to provide service but being evaluated for promotion and tenure on the basis of publication.

Up to the current time Biometry faculty have adapted to this dilemma by emphasizing collaborative research. This in turn has enforced selectivity in choice of consulting clientele. Moreover, since collaborative research can be pursued with no more than a few researchers at a time, Biometry faculty generally limit the number of consulting clients with whom they work. With little student-technician-level consulting assistance, this has meant restricting access to biometrical consulting to a large part of the IANR research community. At the same time, increased demand on departmental services has ensued. Consequently, a number of researchers in need of statistical advice have been frustrated in their attempt to get help.

**Current Research & Consulting Capabilities**

Biometry currently has seven faculty level statisticians involved in research and consulting. Because of the division of their appointments between research and teaching, there are 3.95 faculty-level FTE's assigned to consulting. In addition, there are two statistical programmers and six graduate assistants supported by the department. The graduate assistant's are working on MS degrees in Biometry and are mostly involved in the teaching program. Their involvement in consulting is minimal, however, a "help desk" was established in
spring 1993 which did provide some advisory consulting support.

All faculty are involved in collaborative research, advisory consulting, tutorial activities and the development of novel applications in biometry, as evidenced by participation in regional research, publication in a statistical journal within the past five years, or presentation of a paper on methodology to a statistical organization within the past five years.

Each faculty member attempts to make a certain amount of time available for consulting appointments and some time available for open access. During the semester, due to teaching activities, contact hours for consulting must be limited generally to a maximum of 5-10 hours per week. Most writing of papers and other creative activity necessarily occurs in the summer when there are no Biometry classes offered. How these numbers translate into consulting and research capability depends on the particular clientele and projects with which the faculty are involved. This is because Biometry's typical consulting activity varies from such problems as syntax errors in SAS programs or graduate students forgetting the definition of "level of significance" to the design of a series of experiments for a very sophisticated research project. As a rough average, Biometry faculty may be involved as collaborators in half a dozen projects at a given time. Perhaps two of them per year will produce joint authorships. In addition, a faculty member will be able to provide advisory consulting to 10-20 clients per month. This number will be lower during the semester and higher in the summer. It will also be somewhat lower if the faculty member chooses to do
innovative work in biometry. Unfortunately, for most of the faculty, time for such innovative work is usually unavailable due to the workload described above. Thus, it is generally limited in scope and tends to occur rather slowly.

In recent years, a Biometry faculty member has participated in each Experiment Station project review. This activity requires a heavy time commitment, but there is great potential for improving the quality of agriculture and home economics research through this participation. Unfortunately, the biometrician's advice is often ignored by the researcher which diminishes the effectiveness of the biometrician's input. Thus, there is a question as to whether the payoff is great enough to justify the time and energy commitment of Biometry faculty.

With faculty, support staff, teaching loads and trained graduate students at their current levels, any expansion of Biometry statistical consulting services is not reasonable. What is possible with current resources is a continuation of collaborative research at the current levels, limited advisory consulting, and tutorial activity as circumstances permit. It is essential that each faculty member protect some time in order to develop creative applications of biometry in response to consulting problems and to remain conversant in the latest developments in Biometry. Biometry is not currently effective in a sustained and systematic fashion in satisfying this latter requirement.
B. TEACHING PROGRAM

Personnel

Faculty

Eskridge, Kent M. ................... Associate Professor
Gardner, Charles O. ................ Emeritus Professor
Gotway, Carol A. ..................... Assistant Professor
Johnson, Blaine E. ............ Associate Professor Agronomy/Biometry
Kachman, Stephen D. .............. Assistant Professor
Marx, David B. ....................... Professor & Head
Parkhurst, Anne M. .................. Professor
Schutz, Wilfred M. ................. Asst Vice President & Director
    University-wide Computing & Professor Biometry
Stroup, Walter W. .................... Professor
Young, Linda J. ...................... Associate Professor
Graduate Students (1992-1993)

Bazubwabo, Jean Pierre
*Gardner, Chuck Jr.
*Gibson, Ann
Hadarbach, Driss
*Karle, Valerie
*Milliken, April
Schiefelbein, Richard
*Yang, Yuelong

Graduate Students (1993-1994)

Bazubwabo, Jean Pierre
*Block, Gary L.
*Brush, Tracy
Dudden, Matthew S.
Gardner, Chuck Jr.
*Gibson, Ann
Grau, Scott A.
Holden, Lyman
*Karle, Valerie
*Kjar, Dean
Khayyam, Shemza
Kuoi, Chen Te
Mark Liu Shiyas
Schiefelbein, Richard
*Yang, Yuelong

* = Graduate Assistants
Abstract

The Department of Biometry offers a Master of Science Degree in Biometry. Teaching activities consist of course offerings at the undergraduate and graduate levels, Biometry short courses, seminars and in-service training. Currently the curriculum ranges from an undergraduate level appreciation of biometry to advanced courses in biometrical theory.

Enrollment has increased substantially over the past several years to the point where limits have had to be placed on the class size of several courses. This phenomenon occurs even when enrollments in other departments in the College of Agriculture and Natural Resources decreases. The number of courses in Biometry has expanded from two in 1974 to 15 in 1993. The frequency with which the most popular courses are taught has increased. Student evaluations of the courses have remained consistently very high and the courses as a group have a reputation for being both rigorous and valuable.

The most serious problem is the lack of a doctorate degree program. All of the components are in place that would allow the Department of Biometry to offer a very respectable Ph.D. degree in biometry. No additional resources are required. It is well documented that, even in these difficult economic times, the number of graduates trained in the practice of biometry is not keeping up with the demand.
The purpose of this report is to state the goals of the teaching program, present a historical perspective, review the current capabilities, and identify high priority improvements for maintaining and enhancing the teaching components of the Department of Biometry.

Historical Perspective of Teaching Program

The Department of Biometry had its beginning as a statistical laboratory in 1957. At that time only two applied statistics courses were taught in the College of Agriculture and they were offered only once per year. The first, Agronomy 203, was the precursor of the introductory methods course, Biometry 801, with an enrollment of about 25 students.

The second course, Agronomy 310, was the precursor of the experimental design course, Biometry 802. It had an enrollment of about 10-15 students. Both courses were taught by faculty with academic appointments in Agronomy. Later, a similar course in design was offered in Animal Science which was tailored for designs and examples with animals. Since the Statistical Laboratory did not have academic status, faculty were required to have their academic appointments in subject matter departments.

Enrollments in the two basic courses increased markedly in the early 1970's as agricultural research became more sophisticated and interpretation of data required increased statistical literacy. Furthermore, computer software packages which permit complex analyses have encouraged the use of advanced
techniques in agricultural research. Because of these perceived needs, eight additional graduate courses and one undergraduate course were added between 1974 and 1981 to allow students to access more sophisticated techniques. Two additional faculty positions were added during this time, one in 1976, another in 1979. In 1978, the Statistical Laboratory was restructured to include more data processing and information systems functions and was renamed the Biometrics and Information Systems Center (BISC). One of the additional courses dealt with data processing. It has subsequently been replaced by two SAS minicourses which are offered each semester.

The course offerings and class sizes increased rapidly and the need for assistance from biometrics graduate students greatly increased. The main drawback, at that time, was that BISC did not offer graduate degrees. Thus, students employed on assistantships had divided loyalties and usually could assist for only one semester. These temporary arrangements tended to produce unpredictable quality.

Relief came in 1986, when, as a result of recommendations made by the departmental review team, BISC was split into two units, the Biometrics Center and IANR computing. The Biometrics center was awarded academic status, and two additional faculty were recruited. By that time, all faculty members had their academic appointments in the center, although some faculty maintained courtesy appointments in subject matter departments.
In 1989, the Biometrics Center became the Department of Biometry and in 1991 a masters degree program was initiated. The curriculum has been expanded to include some exciting new directions in biometry such as spatial variation, decision analysis, statistical ecology, applications of fractals and chaos. The faculty are dedicated to helping students apply statistical concepts as well as master the theoretical aspects. The interpersonal aspects of the consulting relationship are addressed in the Consulting Practicum.

The department continues to present biometrics seminars and short courses. Lately, however, the seminars have had to be in house due to lack of funds for outside speakers.

In 1992, the department participated in FIPSE. As part of that program the faculty developed a teaching evaluation plan. The faculty views teaching improvement as the primary motivation for participating in an evaluation process. Monetary rewards are important but tend to be sporadic. Moreover, faculty recognize improvement and evaluation as two distinct processes that require separate documentation.
Courses Offered

Biometry 201
Title: INTRODUCTION TO BIOMETRY (3 cr)

Description:
Wide scope of topics in practical application of biostatistics in agriculture and biology covering collection and organization of data, normal and binomial distributions, elementary probability, regression and correlation, and analysis of variance. Offered twice a semester.

Biometry 801
Title: STATISTICAL METHODS IN RESEARCH
(4 cr, 3 hr lecture, 2 hr lab)

Description:
Statistical concepts and statistical methodology useful in the descriptive, experimental, analytical, and interpretative study of biological phenomena. Data summarization, probability and basic distributions, hypothesis testing, t-tests, analysis of variance, regression and analysis of covariance are discussed. Emphasis is placed on application and understanding of statistics and relevance to the biological problem. Offered every semester.

Biometry 802
Title: EXPERIMENTAL DESIGN
(4 cr, 3 hr lecture, 2 hr lab)

Description:
Presentation of experimental design as a necessary integrated component of agricultural and related issues. Topics include 1) planning, 2) evaluation of precision and assumptions, 3) suitability and efficiency of various experimental designs, 4) integration of various treatment designs, and 5) statistical analysis and interpretation of the data. Offered every semester.
Biometry 810
Title: MULTIVARIATE METHODS (3 cr)

Description:
An introduction to multivariate techniques commonly used in agricultural research with emphasis on general appreciation, relevance and interpretation. The course is divided into three modules. Module I is a study of reduction of dimensionality and multivariate dependencies which includes principle components, factor analysis, and canonical correlation. Module II is a study of classification procedures which includes discriminant analysis, cluster analysis, and multidimensional scaling. Module III is a study of multivariate extensions to the analysis of variance and the general linear model. Offered spring of even-numbered years.

Biometry 896 A
Title: NONPARAMETRIC METHODS (3 cr)

Description:
Covers a wide variety of statistical methods for data which will not satisfy "usual" statistical assumptions. These methods include the sign test, Wilcoxon, Kruskal-Wallis, and Friedman's test, as well as more advanced topics such as factorials and split-plots. Methods for the estimation of nonparametric alternatives to the mean (e.g. median) and their confidence intervals are also considered. Nonparametric tests for goodness of fit (e.g. Kolmogorov-Smirnov test) are included. Basic probability concepts are developed to provide necessary theoretical background. Offered fall of odd-numbered years.

Biometry 896 B
Title: ANALYSIS OF CATEGORICAL DATA AND LOG LINEAR MODELS (3 cr)

Description:
Covers a wide variety of methods to handle categorical data. These include the "classical" log-linear models to evaluate and model independence among classification criteria, the so-called "Grizzle-Starmer-Koch" methods to evaluate homogeneity -- i.e. treatment effects on classification probability -- and methods to evaluate structure in classification, such as symmetry, association, logistic regression, etc. Advanced topics include analysis of repeated categorical measurements, and the relationship of categorical data to "generalized linear models." Offered spring of even-numbered years.
Biometry 896 D
Title: VARIANCE COMPONENT ESTIMATION (3 cr)

Description:
Design and analysis of random effects and mixed models. Topics include 1) Basic theoretical background for models with random effects, 2) Quadratic estimators including Henderson's ANOVA methods, MINQUE, and MIVQUE, 3) optimal design for nested and cross classification models, 4) Likelihood based estimators including maximum likelihood and restricted maximum likelihood, 5) extensions to the analysis of "generalized linear mixed models," and 6) various computing packages. Offered fall of odd-numbered years.

Biometry 896 E
Title: DECISION ANALYSIS (3 cr)

Description:
Introduces basic concepts of statistical decision theory and their applications to decision making in agriculture. Students are exposed to fundamental ideas such as the quantification of risk, utilities, probability, and expectation required for objective decision making. Computer-based decision support systems are considered. Applications of the methodology is discussed with regard to selection problems in statistics and agriculture. Offered fall of odd-numbered years.

Biometry 896 F
Title: ECOLOGICAL STATISTICS (3 cr)

Description:
A survey of statistical methods useful in ecology. Topics include discrete distributions, goodness-of-fit tests, sequential estimation, sequential hypothesis testing, analysis of spatial pattern, capture-recapture techniques, line transect methods, life-stage analysis, population growth models, probit tests, and comparison of survival functions. Offered spring of even-numbered years.
Biometry 896 G
Title: SPATIAL VARIABILITY (3 cr)

Description:
Basic review of statistical methods for detecting nonindependence of data using standard techniques. Introduction of geostatistical concepts will follow including measures of spatial correlation, development and interpretation of semivariograms, nonparametric measures of spatial correlation, and robust estimation of variograms models. Estimation in the presence of spatial correlation is examined using triangulation methods, distance measures, nearest neighbor analysis, and kriging. Lastly, designs which are useful in the presence of spatial correlation are derived. Offered spring of even-numbered years.

Biometry 896 H
Title: REPEATED MEASURES, TIME SERIES AND CHAOS (3 cr)

Description:
Covers a variety of methods to analyze repeated measurements. Introduces basic concepts in time series and dynamic systems as well as standard general linear model techniques such as growth curve analysis, profile analysis, using both the multivariate approach and adjusted univariate statistics.

Biometry 901
Title: MULTIPLE REGRESSION (3 cr)

Description:
Linear regression and related analysis of variance and covariance methods for models with two or more independent variables. Techniques for selecting and fitting models, interpretation parameter estimates, and checking for consistency with underlying assumptions will be emphasized. Particular attention to applications of these techniques to biological data. Topics include partial and multiple correlation, use of dummy variables, covariance models, stepwise procedures, methods for estimating response surfaces, and evaluation of residuals. Offered every fall semester.
Biometry 902
Title: ADVANCED EXPERIMENTAL DESIGN (3 cr)

Description:
This course is an extension of Biometry 802. It deals with more advanced topics in experimental design, such as augmented designs, partially and completely confounded factorials, balanced and partially balanced incomplete block designs, and designs that consider several blocking factors. In each case, the construction of the design is illustrated and the randomization procedure is demonstrated. Considerable ground work is laid by describing the structure of a factorial treatment design and how this relates to experimental design. Offered every spring semester.

Biometry 960
Title: MATRIX ALGEBRA FOR BIOLOGISTS (2 cr)

Description:
Concepts and techniques useful in matrix preparation and manipulation. Development of applications useful in expanding determinants, computing matrix inverses, determining ranks and linear (in)dependence, and finding latent roots and vectors. Special emphasis is placed on an application of matrices to completion of regression (continuous independent variables) and linear model analyses (discrete treatments) using one general linear model, while being useful to a variety of biological research topics. Offered every fall semester.

Biometry 970
Title: LINEAR MODELS (3 cr)

Description:
Methods and underlying principles for analyzing primarily unbalanced data based on a linear statistical model. Special emphasis is placed on determining exact hypothesis being tested and developing understanding of the linear models literature and computer algorithms associated with messy data. Offered fall semesters of even-numbered years.
Biometry 971
Title: BIOMETRICAL MODELLING (3 cr)

Description:
This course is a second course in theory and application of statistical models. It broadens the repertoire of models from a fixed effects model with errors that are independent and normally distributed. The models that will be studied are random effects models, models with both fixed and random effects, models with correlated errors, generalized linear models, non-linear models, and, if time permits, multivariate models. Offered spring semester.

Biometry 990
Title: PRINCIPLES OF STATISTICAL CONSULTING (2 cr)

Description:
First course in statistical consulting. Designed primarily for graduate students in Biometry, this course is designed to prepare them for future consulting work and to provide them with a more comprehensive understanding of applications of statistics than they would obtain from theory and methods courses alone. Issues include the role and purpose of consulting, statistical issues -- understanding the clients' problem, choosing an appropriate procedure, etc. -- and interpersonal issues -- client expectations, difficult clients, working effectively with people, teamwork, etc. Course uses a mix of lecture, discussion, role-playing, and videotaping and discussion of real or simulated consulting meetings. Offered every fall semester.

Biometry 991
Title: PRACTICUM IN STATISTICAL CONSULTING (4 cr)

Description:
Participation in statistical consulting activities of the Department of Biometry under faculty supervision. May take the form of extensive consultation on one highly involved problem or regular availability for many less involved problems over the course of the semester. Students will be expected to prepare written reports to clients summarizing consultation results and to Biometry supervisor summarizing statistical issues, findings, etc. Offered every spring semester.
Teaching has continued to be a major commitment of faculty time and energy. Through the courses that they teach, and the consulting that they do, Biometry faculty have a profound influence on nearly every graduate research program in IANR, and on the professional training and development of the students associated with it.

Student enrollments, student credit hour production, and student contact hours have increased dramatically over the past 7 years, as shown in Figure 1. While student credit hours have increased by almost 70%, teaching faculty FTE have increased by less than 25% during the past 7 years. (Table 5.).

It is significant to note that these increases occurred during a period in which total student credit hour production for the College of Agricultural Sciences and Natural Resources increased by less than 15%. While total student credit hour production for the College of Agriculture has dropped from a peak of 39,483 in the 1980-1981 school year to 31,089 in 1992-93. (Table 2.) credit hour production for the Department of Biometry has risen from 925 to 1490 during the same period.

In 1991 a Master's degree program in Biometry was added. Currently 8 students are enrolled in the Master's degree program. Through their teaching assistantships the graduate students help fill a critical need in the introductory courses. Currently the department offers 4 half time teaching assistantships.
### Current Teaching Capabilities

Biometry currently teaches a total of 18 courses. The courses and their frequency of offering are as follows:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Introduction to Biometry</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>801</td>
<td>Statistical Methods in Research</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>802</td>
<td>Experimental Design</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>810</td>
<td>Multivariate Methods</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 A</td>
<td>Non Parametric Models</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 B</td>
<td>Analysis of Categorical Data</td>
<td>Offered every semester</td>
</tr>
<tr>
<td></td>
<td>and Log Linear Models</td>
<td></td>
</tr>
<tr>
<td>896 D</td>
<td>Variance Component Estimation</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 E</td>
<td>Decision Analysis</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 F</td>
<td>Ecological Statistics</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 G</td>
<td>Spatial Variability</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>896 H</td>
<td>Repeated Measures/Time Series/Chaos</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>901</td>
<td>Multiple Regression</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>902</td>
<td>Advanced Experimental Design</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>960</td>
<td>Matrix Algebra for Biologists</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>970</td>
<td>Linear Models</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>971</td>
<td>Biometrical Modelling</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>990</td>
<td>Principles of Statistical Consulting</td>
<td>Offered every semester</td>
</tr>
<tr>
<td>991</td>
<td>Practicum in Statistical Consulting</td>
<td>Offered every semester</td>
</tr>
</tbody>
</table>

Demand for these courses is generally heavy. Student enrollments, student credit hours, and student contact hours are shown in Tables 1, 3, and 4 and Figures 2, 3, and 4. The 201 class is required for some undergraduate majors (e.g. Agricultural Economics) and strongly suggested for any undergraduate planning to pursue graduate study in a biological discipline. 801 and 802 are required for most College of Agriculture graduate students and are also considered to be valuable classes by the faculty in such areas as the School of Biological Sciences, Department of Geology, the College of Home Economics, etc. Most Ph.D. candidates also take 901. The Linear Models class is becoming
increasingly popular. Linear Models and the other classes are taken primarily by Ph.D. candidates with more specialized needs. However, each of these courses is considered vital to the curriculum of the subject matter discipline for which it is relevant.

To make these classes available, the seven Biometry faculty members each teach one class every semester. In 801 and 802 the faculty are supported by TA's who teach the lab sections. In 201 the two sections offered each semester are taught by TA's. Graders are hired for some of the classes to provide additional support.

In addition to classroom teaching, Biometry faculty present seminars at the departmental and IANR levels. Their purpose is to inform IANR researchers of the latest advances in Biometry and to periodically review basic biometric principles. These are considered quite valuable by IANR researchers and often catalyze collaborative research. Each faculty member presents roughly one seminar per semester. Demand exists for more, but time is not available.

Biometry faculty periodically attend seminars held by other departments. This can be as valuable as a teaching function when questions arise concerning the statistical aspects of the seminar. It allows biometry faculty to discuss biometry as it applies explicitly to a particular subject matter.
### DEPARTMENT OF BIOMETRY
#### STUDENT CREDIT HOURS

**Academic Years 1979-1980 through 1992-1993**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>79-80</th>
<th>80-81</th>
<th>81-82</th>
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<td>BIOM 201</td>
<td>45</td>
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<td>60</td>
<td>81</td>
<td>72</td>
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<td>153</td>
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<tr>
<td>BIOM 801</td>
<td>468</td>
<td>364</td>
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<td>540</td>
<td>476</td>
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<td>432</td>
<td>500</td>
</tr>
<tr>
<td>BIOM 802</td>
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### COLLEGE OF AGRICULTURE
#### STUDENT CREDIT HOURS

**Academic Years 1979-1980 through 1992-1993**

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Biometry
Credit Hours

Credit Hours

Year

Class Number

- 201 - 801 - 802 - 896 - 901 - 902 - 960 - 970 - 990/991
# DEPARTMENT OF BIOMETRY
## STUDENT ENROLLMENT

**Academic Years 1979-1980 through 1992-1993**

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Biometry Enrollment Trend

Figure 2

Enrollment

Year

Class Number

- 201
- 801
- 802
- 896
- 901
- 902
- 960
- 970
- 990/991
### DEPARTMENT OF BIOMETRY
### STUDENT CONTACT HOURS

**Academic Years 1979-1980 through 1992-1993**

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### DEPARTMENT OF BIOMETRY
CREDIT HOURS PER FTE FACULTY AND DIRECT COST PER STUDENT CREDIT HOUR

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<td>998</td>
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Biometry
General Trend

Trend

Year

Enrollment, Credit hours, Contact hours, SCH/FTE

- Enrollment + Credit Hours * Contact Hours ■ SCH/FTE
Proposed Curriculum

BIOM 201
Intro. to Biom. (3 credits)

BIOM 801
Methods (4 credits)

BIOM 802
Exp. Design (4 credits)

BIOM 803
Quality Control (2 credits)

BIOM 804
Dec. Anal. (3 credits)

BIOM 932
Mixed Agronomy (3 credits)

BIOM 901
Mult. Reg. (3 credits)

BIOM 906
Time Series An. (3 credits)

BIOM 902
Adv. Exp. Des. (3 credits)

BIOM 907
Survival Anal. (3 credits)

BIOM 908
Spec. Prob. (3 credits)

BIOM 810
Multivariate Meth. (3 credits)

BIOM 811
MANOVA & Rep. Measures (3 credits)

BIOM 812
Spat. Var (3 credits)

BIOM 813
Eco. Stat. (3 credits)

BIOM 814
Adv. Exp. Des. (3 credits)

BIOM 815
Spec. Prob. (3 credits)

BIOM 816
Mult. Reg. (3 credits)

BIOM 817
Time Series An. (3 credits)

BIOM 818
Spec. Prob. (3 credits)

BIOM 819
Mult. Reg. (3 credits)

BIOM 820
Non-Parametric Methods (3 credits)

BIOM 840
Dec. Anal. (3 credits)

BIOM 896
Eco. Stat. (3 credits)

BIOM 896
Spec. Prob. (3 credits)

BIOM 900
Princ. of Consult. (2 credits)

BIOM 901
Mult. Reg. (3 credits)

BIOM 902
Adv. Exp. Des. (3 credits)

BIOM 903
Survival Anal. (3 credits)

BIOM 907
Spec. Prob. (3 credits)

BIOM 908
Spec. Prob. (3 credits)

BIOM 910
Multivariate Theory (3 credits)

BIOM 970
Lin. Models (3 credits)

BIOM 971
Anal. Cat. Data Log Lin. Models (3 credits)

BIOM 980
Var. Comp. (3 credits)

BIOM 990
Princ. of Consult. (2 credits)
Specific Goals and Challenges

1. Provide a Ph.D. program in Biometry.

2. To provide instruction in graduate and undergraduate biometry courses for IANR students.

3. To provide short courses and seminars for updating IANR staff and faculty.

4. To provide a modern biometry curriculum of sufficient depth and scope to prepare students in the Master’s and Ph.D. degree program along with minors at the M.S. and Ph.D. levels to meet the challenges that lie ahead.

5. To provide a professional environment within which innovative teaching developments can occur and professional development can thrive.
Faculty Opinion Survey

The Department of Biometry is a service-oriented unit providing teaching, consulting, and statistical programming support for various users throughout IANR. Because of this service orientation, a survey of IANR faculty was conducted to measure the effectiveness of Department of Biometry activities.

The four main objectives of the survey were:

1) how often are our services used by Faculty.

2) what services are seen as inadequate.

3) how do faculty rate the content and adequacy of Department of Biometry courses

4) should the Department of Biometry offer a Ph.D. degree in Biometry.

Population

The target population was comprised of all IANR faculty in Lincoln, as well as all faculty assigned to outstate research and extension centers, county extension offices, and the School of Technical Agriculture at Curtis. Surveys were mailed to 623 faculty members.
Data Collection

A total of 153 (24.6%) were returned by the end of the two week period given for return of the questionnaires. One and two way frequency tables and means were tabulated using SAS.
One-Way Frequencies and Means:

What is your faculty rank?

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<th>Frequency</th>
<th>Percent</th>
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<td>Associate</td>
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<tr>
<td>Professor</td>
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<td>41.7</td>
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What percentage of your appointment is in each of the following categories?

This information can be looked at in 3 ways:

Appointment Categories:

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<th>Frequency</th>
<th>Percent</th>
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<td>36.2</td>
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<tr>
<td>25 - 49%</td>
<td>31</td>
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<td>50 - 74%</td>
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<td>28.2</td>
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<td>75 - 100%</td>
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Teaching Categories

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<tr>
<td>25 - 49%</td>
<td>18</td>
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<td>50 - 74%</td>
<td>18</td>
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<td>75 - 100%</td>
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<td>Administrative Categories</td>
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<table>
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<tr>
<td>75 - 100%</td>
<td>50</td>
<td>33.6</td>
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</table>

Overall means for appointments.

RESEARCH 34.82
TEACHING 15.38
ADMINISTRATION 3.49
EXTENSION 45.14

Means for those reporting more than 0 % appointment in an area.

RESEARCH 52.40
TEACHING 34.19
ADMINISTRATION 47.27
EXTENSION 70.06
Administrative Categories

<table>
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<td>75 - 100%</td>
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Extension Categories

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<td>75 - 100%</td>
<td>50</td>
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</table>

Overall means for appointments.

- **RESEARCH**: 34.82
- **TEACHING**: 15.38
- **ADMINISTRATION**: 3.49
- **EXTENSION**: 45.14

Means for those reporting more than 0% appointment in an area.

- **RESEARCH**: 52.40
- **TEACHING**: 34.19
- **ADMINISTRATION**: 47.27
- **EXTENSION**: 70.06
With which department or administrative unit are you primarily affiliated.

<table>
<thead>
<tr>
<th>Department</th>
<th>COUNT</th>
<th>PERCENT</th>
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<td>6.54</td>
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<tr>
<td>Ag.Economics</td>
<td>6</td>
<td>3.92</td>
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<tr>
<td>Ag.Leadership, Ed., &amp; Comm.</td>
<td>3</td>
<td>1.96</td>
</tr>
<tr>
<td>Ag.Meteorology</td>
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<td>2.61</td>
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<td>Agronomy</td>
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<td>Biochemistry</td>
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<td>1.96</td>
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<td>Biological Systems Eng.</td>
<td>11</td>
<td>7.19</td>
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<tr>
<td>Center for Water &amp; Env. Programs</td>
<td>2</td>
<td>1.31</td>
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<td>Cooperative Ext. Service</td>
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<td>4.58</td>
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<tr>
<td>Entomology</td>
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<td>Food Science &amp; Technology</td>
<td>5</td>
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<tr>
<td>Forestry, Fisheries, &amp; Wildlife</td>
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<td>Horticulture</td>
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<td>2.61</td>
</tr>
<tr>
<td>Nutritional Science &amp; Dietetics</td>
<td>2</td>
<td>1.31</td>
</tr>
<tr>
<td>Panhandle Res. &amp; Ext. Center</td>
<td>6</td>
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</table>
Are you familiar with the services of the Department of Biometry?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>122</td>
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<tr>
<td>No</td>
<td>28</td>
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How important is Department of Biometry input into statistical design and analysis in your research?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Very important</td>
<td>58</td>
</tr>
<tr>
<td>Of some importance</td>
<td>50</td>
</tr>
<tr>
<td>Of little importance</td>
<td>12</td>
</tr>
<tr>
<td>Does not apply</td>
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Do you advise graduate students?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
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<tr>
<td>Yes</td>
<td>91</td>
</tr>
<tr>
<td>No</td>
<td>61</td>
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</table>
During an average month, how many times do you and/or your graduate students use each of the following services at the Department of Biometry?

**Data Entry:**

<table>
<thead>
<tr>
<th>Number of Times</th>
<th>Frequency of Response</th>
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<tr>
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<tr>
<td>3</td>
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**Data processing and programming support:**

<table>
<thead>
<tr>
<th>Number of Times</th>
<th>Frequency of Response</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>12</td>
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<td>3</td>
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<tr>
<td>8</td>
<td>1</td>
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<td>10</td>
<td>1</td>
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</table>
SAS training courses:

<table>
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<tr>
<th>Number of Times</th>
<th>Frequency of Response</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>3</td>
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</table>

Biometry seminars:

<table>
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<td>1</td>
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</table>

Other:

<table>
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<tr>
<th>Number of Times</th>
<th>Frequency of Response</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>6</td>
<td>1</td>
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Please rate the services offered by the Department of Biometry that you use:

<table>
<thead>
<tr>
<th>Service</th>
<th>Very Adequate</th>
<th>Adequate</th>
<th>Inadequate</th>
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<tr>
<td>1. Data Entry</td>
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<td>3</td>
<td>83</td>
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<tr>
<td></td>
<td>(16.4%)</td>
<td>(13.1%)</td>
<td>(2.5%)</td>
<td>(68.0%)</td>
</tr>
<tr>
<td>2. Data Processing and Programming Support</td>
<td>31</td>
<td>34</td>
<td>4</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>(24.4%)</td>
<td>(26.8%)</td>
<td>(3.1%)</td>
<td>(45.7%)</td>
</tr>
<tr>
<td>3. SAS Training Courses</td>
<td>18</td>
<td>30</td>
<td>9</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>(15.1%)</td>
<td>(25.2%)</td>
<td>(7.6%)</td>
<td>(52.1%)</td>
</tr>
<tr>
<td>4. Statistical Consulting</td>
<td>59</td>
<td>31</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>(45.0%)</td>
<td>(23.7%)</td>
<td>(6.9%)</td>
<td>(24.4%)</td>
</tr>
<tr>
<td>5. Biometry Seminars</td>
<td>9</td>
<td>17</td>
<td>5</td>
<td>82</td>
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<tr>
<td></td>
<td>(8.0%)</td>
<td>(15.0%)</td>
<td>(4.4%)</td>
<td>(72.6%)</td>
</tr>
</tbody>
</table>

Please comment on the services provided by the Department of Biometry which you consider inadequate or new services which you think could be offered:

What is your rating of the content of the Biometry courses taught by faculty of the Department of Biometry?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>


What is your rating of the adequacy of the Biometry course offerings provided by the Department of Biometry?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Very Adequate</td>
<td>31</td>
</tr>
<tr>
<td>Adequate</td>
<td>49</td>
</tr>
<tr>
<td>Inadequate</td>
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<tr>
<td>No opinion</td>
<td>61</td>
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</table>

Should the Department of Biometry offer a Ph.D. degree in Biometry?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
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<tr>
<td>No</td>
<td>17</td>
</tr>
<tr>
<td>No Opinion</td>
<td>105</td>
</tr>
</tbody>
</table>

How could the Department of Biometry be improved to better accommodate your needs?
Kent Eskridge

Curriculum Vita

Address: Home: 5027 Dudley Work: Department of Biometry
Lincoln, NE 68504 103 Miller Hall
402.464.4638 University of Nebraska
Lincoln, NE 68583-0712

Education:

B.S. 1976 University of Missouri
Kansas City, Missouri Mathematics

B.A. 1976 University of Missouri
Kansas City, Missouri History

M.A. 1981 University of Missouri
Columbia, Missouri Statistics

Ph.D. 1987 University of Nebraska
Lincoln, Nebraska Ag. Economics

Thesis:

Choosing Optimal Plant Varieties: A Comparison of Risk Models and Common Selection Practices

Professional Experience:

Kansas City, Mo.

Graduate Assistant Iowa State University 1978-1979

Substitute Teacher Kansas City, Mo. Public Schools 1979-1980

Graduate Assistant University of Missouri-Columbia 1980-1981

Statistician Missouri Dept. of Natural Resources 1981-1981
Jefferson City, Mo.

Research Associate Human Resource Data Systems 1981-1983
Columbia, Mo.
Consultant and Manager  University of Nebraska  
            of Data Processing  Lincoln, Ne.  1983-1987

Assistant Professor  University of Nebraska  
            of Biometry  Lincoln, Ne.  1987-1992

Associate Professor  University of Nebraska  
            of Biometry  Lincoln, Ne.  1992-present

Private Consultant  Economic Research  
            State of Nebraska  1987-Present  
            Sandoz Pharmaceuticals  1987-Present  
            Harris Technologies  1985-Present  
            Koers Consulting Company  1985-Present  
            Conagra Flour Milling Co.  1990-Present  
            Amigos Restaurants  1990  
            CIMMYT - Islamabad, Pakistan  1986  
            ISABU - Bujumbura, Burundi  1993

Professional Societies:

American Statistical Association  
Biometrics Society  
American Agricultural Economics Association  
Sigma Xi Scientific Society  
Crop Science Society of Agronomy  
Decision Sciences Institute

Refereed Journal Publications:


Invited Papers:


K. M. Eskridge. 1986. Estimation Risk and Choice of Risk Efficient Production Plans. This paper was selected and to be read to the annual meetings of the American Agricultural Economics Association. Reno, Nevada. July 1986. However, the paper was withdrawn due to an international consultancy in Pakistan.


Other Publications:


**Contributed Papers:**


A. Weiss, K.M. Eskridge, J.R. Smart, and D.A. Mortensen. An approach to modeling herbicide damage to corn over large geographic areas. NC202 Meeting: Biological and Ecological Basis for a Weed Management Model to Reduce Herbicide Use in Corn. Lincoln, NE. July 1991.


To be submitted:

K. M. Eskridge, O. S. Smith, and P. F. Byrne. Comparison of cultivars to checks using reliability functions of test-check differences. In revision Theoretical and Applied Genetics


A. Weiss, K.M. Eskridge, J.R. Smart, and D.A. Mortensen. Choosing risk efficient herbicide treatments for corn production based on simulation of the CERES-Maize crop model. To be submitted to Agronomy Journal

D. H. Meyer, B. E. Johnson, and K. M. Eskridge. Genotype by grain-fill interval interaction in grain sorghum hybrids. To be submitted to Maydica

B. Dierberger, L. Moser, K. Eskridge, and K. Vogel. Optimum germination temperature for four switchgrass cultivars. To be submitted to the Agronomy Journal

D. Walters, C. Shapiro, and K. Eskridge. Residual soil nitrate utilization by corn as influenced by tillage, rotation and cover crop. To be submitted to Agronomy Journal


Grant Activities:

Awarded a Research Council travel grant to present a paper entitled "Safety First and Selection for Genotypic Stability" at the 1988 annual meetings of the American Society of Agronomy, Anaheim, CA. ($500)

Awarded a Research Council travel grant to present an invited paper entitled "Safety-First Models Useful for Selecting Stable Cultivars" to a Symposium on Genotype-Environment Interaction, Louisiana State University, Baton Rouge, LA., February 1990. ($500)

Awarded FIPSE teaching grant to purchase a video camera and stand for use in a Biometry consulting practicum class. March 1991. ($500)
Served as cooperator on industry grant from Becton Dickinson Microbiology Systems for: Evaluation of transport media for maintenance of *Treponema hyodysenteriae*. Principle investigator: Gerald Duhamel. 1991. ($4000)


Awarded a Research Council travel grant to give a selected presentation entitled "Using the CATMOD procedure to estimate linkage between pairs of gene loci from offspring of selfed heterozygotes" to the SAS User's Group International Meetings, Honolulu, HA., April 1992. ($790)

Awarded an honorarium for service provided to MVP Laboratories and Dr. Alex Hogg, UNL Department of Veterinary Science regarding testing the efficacy of an actinobacillus pleuropneumoniae vaccine against APP serotypes 1, 3, 5, 9. March 1992 ($150).

Awarded contract as cooperator on a National Institute of Environmental Health Sciences grant: Childhood blood lead - pre and postnatal sources. Principal investigator: Carol Angle, UNMC. September 1992 ($11,050).

Awarded contract as cooperator on a National Institute of Environmental Health Sciences grant: Childhood blood lead - pre and postnatal sources. Principal investigator: Carol Angle, UNMC. June 1993 ($5,050).


Submitted a research proposal to the Decision Sciences Center, (Dr. Sang Lee, Director) Fall 1989 entitled "Utilization of Decision Theory for the Selection of Optimal Grain Crop Varieties and Application of Expert Systems to Implement this Approach". Principal investigators: Kent M. Eskridge, Blaine E. Johnson, and Robert F. Mumm.

Submitted a research proposal to Pioneer Hi-Bred Seed International Inc. Spring 1989 entitled "An Evaluation of the Effectiveness of an Intuitive Selection Index in Long-Term Selection Projects". Principal investigators: B. E. Johnson and K. M. Eskridge.


Submitted a proposal to Sandoz Research Institute for financial support to the Department of Biometry to aid Sandoz with research, consulting and education of staff. Spring 1991. Investigator: Kent Eskridge.

Submitted a research proposal to the north central integrated pest management competitive grant committee entitled "A modeling approach to evaluate avoidance mechanisms in plant pests in corn" Fall 1991. Investigators: Albert Weiss, Timothy Arkebauer and Kent Eskridge.

Submitted a research proposal to the north central integrated pest management competitive grant committee entitled "A modeling approach to evaluate avoidance mechanisms in corn/velvetleaf ecosystems" January 1992. Principal investigators: Albert Weiss, Timothy Arkebauer and Kent Eskridge.

Submitted a research pre-proposal to Pioneer Hi-Bred International entitled "An evaluation of methods used to characterize yield advantage of maize hybrids relative to a check based on limited trial information". March 1993. Principal investigator: Kent M. Eskridge.
Charles O. Gardner

Curriculum Vita

Address: Home: 5835 Meadowbrook Lane Work: Department of Biometry
Lincoln, NE 68510 University of Nebraska
402.489.1410 103 Miller Hall
402.472.2903
Lincoln, NE 68583-0712

Education:

B.Sc. 1941 University of Nebraska Technical Science in Agriculture
M.B.A. 1943 Harvard University Business Administration
M.S. 1948 University of Nebraska Agronomy - Botany
Ph.D. 1951 North Carolina State University Statistics

Professional Experience:

Assistant Extension University of Nebraska 1946-1948
Agronomist

Assistant North Carolina State University 1951-1952
Statistician

Associate Professor University of Nebraska 1952-1957
of Agronomy

Visiting Professor University of Wisconsin 1962-1963
of Genetics

Chairman University of Nebraska 1957-1968
Statistical Laboratory

Professor of University of Nebraska 1957-1970
Agronomy

Regents Professor University of Nebraska 1970-1989

Interim Head University of Nebraska 1988-1989
Biometrics
Regents University of Nebraska
Professor Emeritus Department of Biometry

Professional Academic Societies:

Alpha Zeta
Gamma Sigma Delta
Sigma Xi
Phi Kappa Phi

Honors and Awards:

Graduation with High Distinction, University of Nebraska, 1941.
Certificate of Superior Scholarship, University of Nebraska, 1941.
Charles Stuart Fellowship, University of Nebraska, 1941.
$1000 Scholarship, Harvard University, 1942.
Designated "Foundation Professor of Agronomy" (Regents Distinguished Professorship), University of Nebraska, 1970.
Gamma Sigma Delta International Award for Distinguished Service to Agriculture, 1977.
Crop Science Award, Crop Science Society of America, 1978.
Fellow, American Association for the Advancement of Science, 1980.
University of Nebraska Award for Outstanding Research and Creative Activity, 1981.
Crop Science Dekalb-Pfizer Distinguished Career Award, Crop Science Society of America, 1984.
Distinguished Service Award, United States Department of Agriculture, 1988.
Agronomic Service Award, American Society of Agronomy, 1988.
Maydica, Vol. 34, Issue No. 1, 1989 was dedicated to Dr. Charles O. Gardner for his 40 years of significant contributions to quantitative genetics and maize breeding.

National Offices Held:

President, Crop Science Society of America, 1975.
President, American Society of Agronomy, 1982.
Member, Steering Committee, Section O Agriculture, American Association for the Advancement of Science, 1981-1986.
Chairman, Section O Agriculture, American Association for the Advancement of Science, 1987.
Member, Regional Advisory Board, Eastern North American Region, Biometric Society, 1959-62 and 1965-68.
National Committee Service:

Biometric Society Advisory Board, 1959-62 and 1965-68.
Board of Directors, Crop Science Society of America, 1974-76 (Chairman, 1975).
Board of Directors, American Society of Agronomy, 1974-76.
National Committee to develop a Title XII International Maize Planting Grant Proposal submitted to AID, 1978-80.
National Corn Research Coordinating Committee, 1980-82.
Board of Directors, American Society of Agronomy, 1981-83. (Chairman, 1982).
American Association for the Advancement of Science Council, 1988.
Numerous committees of the American Society of Agronomy, Crop Science Society of America, and American Association for the Advancement of Science.

Editorial Committees:

Associate Editor, Crop Science, 1964-66.
Associate Editor, Agronomy Journal, 1971-73.
Advisory Board, Egyptian Journal of Genetics and Cytology, 1976-Present
Advisory Board, Brazilian Journal of Genetics, 1978-Present.

Memberships in Professional Organizations:

American Society of Agronomy (Fellow, 1964) (President, 1982).
Biometric Society (Regional Advisory Board), 1959-62, 1965-68.
Genetic Society of America
American Association for the Advancement of Science (Fellow, 1981) (Member at large of Section O Agriculture 1981-86, Chairman 1987, Member of Council 1988).
Crop Science Society of America (President, 1975) (Fellow 1985).
Council for Agricultural Science and Technology
American Genetic Association
Sigma Xi (President of Nebraska Chapter).
Gamma Sigma Delta (President of Nebraska Chapter).
Alpha Zeta (Secretary of Nebraska Chapter).
Phi Kappa Phi
American Registry of Certified Professionals in Agronomy, Crops and Soils (ARCPACS).
Invited Presentations:


Estimation of genetic variances in F<sub>n</sub> populations using Design III mating system of Comstock and Robinson. Corn Quantitative Genetics Conference, Chicago, IL, March 5, 1963.

Estimation of generic parameters using means of varieties, variety crosses, and derived populations of corn. Corn Quantitative Genetics Conference, Chicago, IL, March 5, 1963.

Effect of linkage on estimates of genetic parameters in populations representing early generations following a cross of homozygous lines of corn. Iowa State University, Ames, IA, April 14, 1964.

Investigations involving the varieties Krug and Tabloncillo. Inter-American Conference of Maize Geneticists and Breeders. Rockefeller Foundation, Mexico City, Mexico, June 29-July 3, 1964.

Statistical genetic theory and procedures useful in studying varieties, variety crosses and related populations. IV Reunion Latinoamericana de Fitotecnia, Lima, Peru, November 1-7, 1964.

A general model for genetic effects. University of California, Davis, CA, January 24, 1966.

A genetic model used to evaluate the breeding potential of open-pollinated varieties of corn. International Symposium on Genetics, Piracicaba, Brazil, July 26, 1966.

Results of ten years of individual plant selection for high grain yield in an open-pollinated variety of corn. VII Reunion Latinoamericana de Fitotecnia, Maracay, Venezuela, September 19, 1967.


Use of general genetic model for fixed effects to evaluate breeding potential of populations, strains or lines and to predict performance in advanced generations of hybrid populations. Seventeenth Annual National Poultry Breeders’ Roundtable, Kansas City, MO, May 3, 1968.

Mutation studies involving quantitative traits. International Symposium on Present State in Mutation Breeding, Mito, Japan, August 15, 1968.

Mutation studies, recurrent selection programs and use of exotic germ plasm in corn improvement at the University of Nebraska. National Taiwan University, Taipei, Taiwan, September 3, 1968.

Recurrent selection studies and mutation breeding for the improvement of yield in maize at the University of Nebraska. University of the Philippines, Los Banos, Laguna, September 6, 1968.

Effect on means and variances of incorporating exotic germ plasm into adapted varieties and on predictions of progress from selection. Corn Quantitative Genetics Conference, Chicago, IL, March 4, 1969.

A summary of ten generations of mass selection for high grain yield in an adapted open-pollinated variety of corn. NCR2 North Central Corn Breeding Technical Committee Meeting, Chicago, IL, March 4, 1969.

Special problems in mutation breeding in allogamous species. Some results in maize mutation research at the University of Nebraska. Mutation breeding in maize. A one-week lecture series at the International Atomic Energy Agency International Training Course in Mutation Breeding, Casaccia, Italy, May 12 to June 20, 1969.


Some results from mass selection and mutation breeding in corn and their implications in sweet corn breeding. Nineteenth Annual Meeting, National Sweet Corn Breeders Association, Chicago, IL, December 9, 1969.

The role of mass selection and mutagenic treatment in modern corn breeding. Twenty-fourth Annual Corn and Sorghum Research Conference, American Seed Trade Association, Chicago, IL, December 9-11, 1969.


Quantitative genetic studies and population improvement in maize. School of Life Sciences, University of Nebraska, Lincoln, NE, November 11, 1976.

Recurrent selection systems used in maize breeding, summary of results obtained, and possible application to other crops. Hermitage Research Station, Warwick, Queensland, Australia, January 26, 1977.

Predicting gains to be expected from different recurrent selection systems and kinds of estimates needed for the prediction equations. Hermitage Research Station, Warwick, Queensland, Australia, January 26, 1977.


Expected direct and correlated responses to selection for yield alone compared to simultaneous selection for several traits using different selection indices in sorghums. Hermitage Research Station, Warwick, Queensland, Australia, January 27, 1977.

Population improvement in maize at the University of Nebraska through recurrent selection systems. Department of Primary Industries, Mareeba, Queensland, Australia (Southedge Research Station, Walkamn Research Station, Atherton Tablelands Research Station, Meringa Experiment Station), February 7, 1977.

Quantitative genetic studies in sorghum and their application in predicting progress to be expected from different recurrent selection systems. Atherton Tablelands Research Station, Atherton, Queensland, Australia, February 8, 1977.

Quantitative genetic studies and population improvement at the University of Nebraska. University of Western Australia, Perth, Western Australia, February 22, 1977.

Recurrent selection systems used effectively for the improvement of maize populations at the University of Nebraska and elsewhere. Waite Agricultural Research Institute, Adelaide, South Australia, February 25, 1977.

Quantitative genetic studies in maize and their application in planning breeding systems and in interpreting results of recurrent selection programs at the University of Nebraska. University of Sidney, New South Wales, Australia, (C.S.I.R.O. scientists attending), March 4, 1977.
Quantitative genetic studies in maize and their application in planning breeding systems and in interpreting results of recurrent selection programs at the University of Nebraska. University of Nebraska. University of Queensland, Brisbane, Queensland, Australia (C.S.I.R.O. and Bureau of Sugar Experiment Stations scientists attending), March 16, 1977.


Quantitative genetic studies in sorghum at the University of Nebraska. Universidad Autonoma Agraria "Antonio Narro," Saltillo, Mexico, April 12, 1978.

Results of W.A. Compton from two cycles of reciprocal full-sib selection at the University of Nebraska. Universidad Autonoma Agraria "Antonio Narro," Saltillo, Mexico, April 13, 1978.


Contributions of quantitative genetics to plant breeding. Commemorative lecture in celebration of the 10th anniversary of the Graduate College, Antonio Narro Agricultural University, Saltillo, Mexico, September 3, 1981.

Some applications of electrophoresis to plant breeding. Commemorative lecture in celebration of the 10th anniversary of the Graduate College, Antonio Narro Agricultural University, Saltillo, Mexico, September 4, 1981.

Genetic information from the Gardner-Eberhart model for generation means. Closing plenary session of IX Congreso Nacional de la Sociedad Mexicana de Fitotecnia, Buenavista Saltillo, Coahuila, Mexico, August 3-7, 1982.

Mass selection studies in three maize populations at the University of Nebraska and recurrent full-sib family selection for leaf freckles and wilt disease tolerance in two maize populations. Center for Agricultural Investigations in the North Gulf Region, National Institute for Agricultural Investigations, Rio Bravo, Mexico, June 4, 1982.
Population improvement and its integration with hybrid development activities to produce superior maize cultivars for different maize-growing areas of Pakistan. Invitation paper presented at Pakistan Agricultural Research Council - National Agricultural Research Center, Islamabad, Pakistan, September 9, 1986.


Population improvement and its integration with hybrid development activities to develop superior cultivars for the tropics - some efficient and integrated schemes. Invitation paper presented at the XII Meeting of Maize Researchers in the Andean Zone, Quito Ecuador, October 4, 1986.


Genotype x environment interaction and its implications in maize breeding in international and national programs. Invited seminar presented to the staff of the International Center for Maize and Wheat Improvement, El Batan, Mexico, May 29, 1987.

Quantitative genetic research in maize at the University of Nebraska. Invited seminar presented to Department of Genetics staff, National Institute for Agricultural Technology, Secretary of State for Agriculture and Animal Husbandry, Castelar, Argentina, September 11, 1987.

Management of germplasm resources and the development and improvement of maize populations used as sources of new inbred lines and hybrid. Invited seminar presented to public and private plant breeders at Pergamino Experimental Station, Pergamino, Argentina, September 18, 1987.


Breeding for cold and freeze tolerance and for disease resistance in maize. Invitation seminar presented to the maize breeding staff, Novi Sad University, Novi Sad, Yugoslavia, October 10, 1980.

Breeding for tolerance to environmental and biological stresses in maize. Invitation seminar presented to the maize breeding staff, Maize Research Institute, Osijek University, Osijek, Yugoslavia, October 12, 1980.

Nature of gene effects controlling quantitative traits in maize, knowledge about them, and breeding systems for maize improvement. Invited lecture presented to Leaders of National Maize Improvement Programs in developing countries, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 11, 1989.

Predicting progress from selection and utilizing estimates of genotype x environment interaction and experimental error in identifying the target population of environments for any maize-breeding program. Invited lecture presented to Leaders of National Maize Improvement Programs in developing countries, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 12, 1989.

The diallel cross and related populations as sources of genetic information for planning breeding programs and utilizing germplasm resources. Invited seminar presented to Leaders of National Maize Improvement Programs in developing countries and to the staff of the Maize and Wheat Improvement Programs, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 13, 1989.

Conventional Plant Breeding and Biotechnology: a Complementary Approach to Crop Improvement. Invited seminar presented at Khamphaengsaen Campus, Kasetsart University, Thailand, to combined biotechnology staffs of the Khamphaengsaen Campus and the Central Lab, Bangkok Campus. May 9, 1990.


Plant Breeding and Biotechnology. Invited speaker at joint meeting of the staff of the International Center for Tropical Agriculture (CIAT) and Program Leaders, Maize Programs of all South American Countries. Cali, Colombia, Feb. 15, 1991.

Mating Designs and Field Designs in Plant Breeding. Invited seminar, Department of Biometry, University of Nebraska, Lincoln, Nebraska, April 25, 1991.

Experimental Designs and Statistical Methods Useful in Plant Breeding and Genetics. Summer course in Biometrics, Department of Biometry, University of Nebraska, June, 1991.
Population improvement and its integration with hybrid development activities to produce superior maize cultivars for different maize-growing areas of Pakistan. Invitation paper presented at Pakistan Agricultural Research Council - National Agricultural Research Center, Islamabad, Pakistan, September 9, 1986.


Population improvement and its integration with hybrid development activities to develop superior cultivars for the tropics -- some efficient and integrated schemes. Invitation paper presented at the XII Meeting of Maize Researchers in the Andean Zone, Quito Ecuador, October 4, 1986.


Genotype x environment interaction and its implications in maize breeding in international and national programs. Invited seminar presented to the staff of the International Center for Maize and Wheat Improvement, El Batan, Mexico, May 29, 1987.

Quantitative genetic research in maize at the University of Nebraska. Invited seminar presented to Department of Genetics staff, National Institute for Agricultural Technology, Secretary of State for Agriculture and Animal Husbandry, Castelar, Argentina, September 11, 1987.

Management of germplasm resources and the development and improvement of maize populations used as sources of new inbred lines and hybrid. Invited seminar presented to public and private plant breeders at Pergamino Experimental Station, Pergamino, Argentina, September 18, 1987.


Breeding for cold and freeze tolerance and for disease resistance in maize. Invitation seminar presented to the maize breeding staff, Novi Sad University, Novi Sad, Yugoslavia, October 10, 1980.

Breeding for tolerance to environmental and biological stresses in maize. Invitation seminar presented to the maize breeding staff, Maize Research Institute, Osijek University, Osijek, Yugoslavia, October 12, 1980.

Nature of gene effects controlling quantitative traits in maize, knowledge about them, and breeding systems for maize improvement. Invited lecture presented to Leaders of National Maize Improvement Programs in developing countries, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 11, 1989.

Predicting progress from selection and utilizing estimates of genotype x environment interaction and experimental error in identifying the target population of environments for any maize-breeding program. Invited lecture presented to Leaders of National Maize Improvement Programs in developing countries, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 12, 1989.

The diallel cross and related populations as sources of genetic information for planning breeding programs and utilizing germplasm resources. Invited seminar presented to Leaders of National Maize Improvement Programs in developing countries and to the staff of the Maize and Wheat Improvement Programs, International Center for Maize and Wheat Improvement, El Batan, Mexico, October 13, 1989.

Conventional Plant Breeding and Biotechnology: a Complementary Approach to Crop Improvement. Invited seminar presented at Khamphaengsaen Campus, Kasetsart University, Thailand, to combined biotechnology staffs of the Khamphaengsaen Campus and the Central Lab, Bangkok Campus. May 9, 1990.


Plant Breeding and Biotechnology. Invited speaker at joint meeting of the staff of the International Center for Tropical Agriculture (CIAT) and Program Leaders, Maize Programs of all South American Countries. Cali, Colombia, Feb. 15, 1991.

Mating Designs and Field Designs in Plant Breeding. Invited seminar, Department of Biometry, University of Nebraska, Lincoln, Nebraska, April 25, 1991.

Experimental Designs and Statistical Methods Useful in Plant Breeding and Genetics. Summer course in Biometrics, Department of Biometry, University of Nebraska, June, 1991.


Genetic Model Used and Recent Results Comparing Intra-population and Inter-population Recurrent Selection Systems Used by W. A. Compton and S. L. Tragesser at the University of Nebraska. Seminar presented to Research Staff, International Center for Maize and Wheat Improvement, and Directors of National Maize Breeding Programs in developing countries, October 4, 1991.


Scientific Publication and Technical Papers:


Non-Technical Publications:


Gardner, C. O. 1947. Crop varieties in Nebraska. Ext. Cir. 100 Revised, University of Nebraska.


Gardner, C. O. 1948. Producing hybrid seed corn in Nebraska. Ext. Cir. 181, University of Nebraska.


Contributed Papers:


Carol A. Gotway
Curriculum Vita

Address: Home: 60 Windsor Dr. Papillion, NE 68128 402.597.1426
Office: Department of Biometry University of Nebraska 103 Miller Hall Lincoln, NE 68583 402.472.2903

Education:
B.S. 1984 Bradley University Mathematics
B.S. 1984 Bradley University Geology
M.S. 1986 Iowa State University Statistics
Ph.D. 1989 Iowa State University Statistics

Theses:

Professional Experience:
Research/Laboratory Assistant Department of Geology Bradley University 1982-1984
Graduate Assistant/Course Instructor Department of Statistics Iowa State University 1984-1986
Statistical Consultant Agricultural Experiment Station Iowa State University 1986-1987
Researcher Department of Statistics Iowa State University 1987-1989
Post-Doctoral Research Appointment
Centre de Geostatistique
Fontainebleau, France
1989-1990

Statistical Consultant
Sandia National Laboratories
1990-1992

Assistant Professor
Department of Biometry
University of Nebraska
1992-Present

Other Experience:

Sandia Award for Excellence, 1991 - Sandia National Laboratories
George W. Snedecor Award, 1988 - Iowa State University
Mu Sigma Rho, 1986 - National Statistical Honorary
Shell Oil Research Fellowship, 1986
PACE (Premium for Academic Excellence) Award, 1984 - Iowa State University
Phi Kappa Phi, 1983 - National Scholastic Honorary

Professional Societies:

American Statistical Association
American Society for Quality Control
American Society for Quality Control Certified Quality Engineer
International Association for Mathematical Geologists
American Geophysical Union

Publications:

Refereed Journal Articles:


Technical Papers:


**Invited Presentations:**

"Distribution Function Estimation Using Correlated Data." Presented to the Nebraska Chapter of the American Statistical Association, December 10, 1992, Omaha, NE.

Applied Geostatistics Workshop with D.B. Marx and G.W. Hergert. For the American Association of Agronomists, October 31-November 2, 1992, Minneapolis, MN.


**Contributed Presentations:**

"Sequential Indicator Simulation of Lithology with Application to Vadose Zone Water Flow and Transport." Presented at the American Geophysical Union Spring Meetings. May 11-15, 1992, Montreal, Canada.

**Additional Research:**


Western Biometrics Section Invited Paper: "Geostatistical Tools Useful in the Physical Sciences," To be presented at WNAR meetings, June 28-30, 1993, Laramie, WY.

Manuscripts Reviewed 1993:

2 manuscripts for *Journal of the American Statistical Association*
2 manuscripts for *Water Resources Research*
1 manuscript for *Journal of Computational and Graphical Statistics*
1 manuscript for *Journal of Weed Technology*
1 manuscript for *Journal of Geographical Analysis*
1 manuscript for *Soil Science of America Journal*

Books Reviewed 1993:


Project Reviews 1993:

Participated in 3 project reviews:
2 - Department of Home Economics
1 - Department of Agronomy

Grants Submitted 1993:


Blaine E. Johnson

Curriculum Vita

<table>
<thead>
<tr>
<th>Address:</th>
<th>Home:</th>
<th>Office:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2940 South 26th</td>
<td>326 Keim Hall</td>
</tr>
<tr>
<td></td>
<td>Lincoln, NE 68502</td>
<td>University of Nebraska</td>
</tr>
<tr>
<td></td>
<td>402.421.3314</td>
<td>Lincoln, NE 68583</td>
</tr>
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<td></td>
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<td>402.472.1562</td>
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Education:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Year</th>
<th>Institution</th>
<th>Major/Minor</th>
</tr>
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<tbody>
<tr>
<td>B.S.</td>
<td>1971</td>
<td>University of Nebraska</td>
<td>Agronomy/Ag Honors</td>
</tr>
<tr>
<td>M.S.</td>
<td>1973</td>
<td>Oregon State University</td>
<td>Crop Science major</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>1986</td>
<td>University of Nebraska</td>
<td>Agronomy</td>
</tr>
</tbody>
</table>

Theses:

Heterosis and inbreeding in the progeny of genetically diverse paternal clones of *Festuca arundinacea* Schreb. M.S. thesis.

A model for finding the relative weights of traits used in simultaneous multi-trait selection. Ph.D. dissertation.

Professional Experience:

<table>
<thead>
<tr>
<th>Position</th>
<th>Institution</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Technician</td>
<td>University of Nebraska</td>
<td>1968</td>
</tr>
<tr>
<td>Teaching Assistant</td>
<td>University of Nebraska</td>
<td>1968-1969</td>
</tr>
<tr>
<td>Lab Technician</td>
<td>University of Nebraska</td>
<td>1969-1971</td>
</tr>
<tr>
<td>Research Assistant</td>
<td>Oregon State University</td>
<td>1971-1972</td>
</tr>
<tr>
<td>Research Assistant</td>
<td>Cornell University</td>
<td>1973</td>
</tr>
</tbody>
</table>
Owner/Operator  
Farm/Ranch  
Cash Grain and Cow/Calf Operation, North central Nebraska  
1973-1983

Graduate Research/Teaching Assistant  
USDA/ARS Research Geneticist and Adjunct Assistant Professor  
University of Nebraska Biometrics Center  
University of Nebraska Agronomy Department  
1983-1986
1986-1989

Assistant Professor  
University of Nebraska Agronomy Department  
1989-1992

Associate Professor  
University of Nebraska Agronomy Department  
1992-present

Courtesy Professor  
University of Nebraska Department of Biometry  
Present

Professional Societies:

American Association for the Advancement of Science  
American Society of Agronomy  
American Statistical Association  
Biometric Society  
Crop Science Society  
International Association for Genetics in Agriculture  
Nebraska Corn Breeders Association  
Editorial Board for Maydica  
NCR-21, Regional Committee on Quantitative Genetics  
Alpha Zeta  
Gamma Sigma Delta  
Phi Kappa Phi  
Sigma Xi

Other Memberships:

Graduate Faculty Fellow, University of Nebraska  
Editorial Board for Maydica  
Editorial Board for Genetica  
Faculty Associate, Center for Biotechnology, UNL  
NCR-21, Regional Committee on Quantitative Genetics
Invited Papers:


Grants Received:

ARD/IANR Interdisciplinary Research Program. Title: Mapping of loci affecting the uptake and utilization of nitrogen in maize. (Principal investigator). $36,000 over three years, 1990-1993.

USDA Midwest Water Quality Initiative. Title: Determining Crop N status to indicate need for fertigation. (Co-investigator). $204,000 over five years, 1990-1995.

Nebraska Corn Board. Title: Nebraska Corn Quality Evaluation and Improvement. (Co-principal investigator). $27,000 over two years, 1991-1993.


UN Foundation, Crop Production Trust Fund. Title: Determining the relationship between non-senescence of corn hybrids and nitrogen management. (Principal investigator). $29,750 over two years, 1992-1993.


Pioneer Hi-Bred International, Inc. Title: Determining the optimal number of families to be retained in each generation during inbred line development. (Principal investigator). $29,750 over two years, 1992-1993.

Publications:


Abstracts:


Symposium or Proceedings:


International Travel:


Stephen D. Kachman

Curriculum Vita

Address: Home: 4300 F Street
          Lincoln, NE 68510
          402.488.4399

          Work: Department of Biometry
          103 Miller Hall
          University of Nebraska
          Lincoln, NE 68583-0712
          402.472.2903

Education:

B.S.  1981  Michigan State University
      East Lansing, Michigan
          Microbiology

M.S.  1986  University of Illinois
          Champaign-Urbana, Illinois
          Animal Breeding & Genetics

Ph.D. 1988  Montana State University
            Bozeman, Montana
            Statistics

Theses:

Kachman, S.D. (1986), Prediction of genetic merit for growth curve parameters in outbred
ICR mice, University of Illinois, MS Thesis.

Kachman, S.D. (1988), Inference procedures for fixed effects in multivariate mixed models,
Montana State University, Ph.D. Thesis.

Professional Experience:

Statistical Analyst  Michigan State University
                    Dairy Science Department  1980-1981

Teaching Assistant  University of Illinois
                    Plant and Animal Genetics  1982

Graduate Research  University of Illinois
Assistant          Animal Science Department  1981-1984

Math Lecturer  Montana State University
              Mathematics Department  1984-1987

Graduate Research  Montana State University
Assistant          Agriculture Experiment Station  1987-1988
Post-Doctoral Associate  Cornell University Animal Science Department  1988-1990
Assistant Professor  University of Nebraska Department of Biometry  1990-Present

Scholastic Honor:


Professional Societies:

American Society of Animal Science
American Statistical Association

Refereed Journal Publications:


Abstracts:


Other Publications:


To Be Submitted:


**Statistical Experience:**

Developed a method for testing hypotheses in multivariate mixed models with unknown covariance matrices.

Developed an estimator of variance components for growth curve parameters.

Collection and analysis of lactation field records.

Assisted in the design and analysis of several projects involving cattle, poultry, sheep, swine and mice.

Analysis of data collected on a variety of projects including grizzly bear mortality in Yellowstone National Park.

Analysis of data with SAS, BMDP, SPSSX, and Harvey’s LSMLMW.

**Teaching Experience:**

Taught two sections of introductory math and statistics classes each quarter from the fall of 1984 through the spring of 1987.

Ran a lab section of Plant and Animal Genetics.

Instructed a number of graduate students in the use of a variety of computer packages.

**Quantitative Genetics Experience:**

Developed predictors of genetic merit for growth curve parameters and for traits influenced by regulating traits.

Assisted in the design, implementation and analysis of a divergent selection study for age and weight at puberty in mice.
Conducted a study of the phenotypic and genetic variability of growth curve parameters in mice.

Programming Experience:

Developed a general purpose ration formulation program for microcomputers at Montana State University.

Developed programs to handle a variety of statistical problems at Michigan State University, University of Illinois, and Montana State University.

Developed educational programs for the PLATO computer system on waste management and dairy herd management at Michigan State University.
David Benjamin Marx

Curriculum Vita

Address: Home: 7644 Grand Oaks Cr. Lincoln, NE 68516
        Work: Department of Biometry University of Nebraska
              103 Miller Hall
              Lincoln, NE 68583-0712
              402.472.2903

Education:

BA 1968 College of Wooster (Chemistry)
MA 1970 University of Missouri (Statistics)
Ph.D. 1977 University of Kentucky

Thesis:

Doctoral Dissertation: A Bayesian Classification of Samples into Multinomial Populations

Professional Experience:

Teaching Assistant University of Missouri 1968-69
Assistant Instructor University of Missouri 1969-70
Teaching Assistant University of Kentucky 1970-73
Instructor University of Kentucky Evening Class Program 1970-74
Research Assistant Tobacco and Health Research Institute Jan-May 73
Research Associate Tobacco and Health Research Institute June 73-74
Lecturer University of Kentucky 1974
Assistant Professor University of Arizona Department of Statistics 1975-1979
Assistant Professor  University of Arkansas  1979-1981
Associate Professor  University of Arkansas  1981-1988
Professor  University of Arkansas  1988-1989
Professor and Head  University of Nebraska  1989-Present
Department of Biometry

Consultant  University of Kentucky Medical Center
Dept. of Community Med.  1971-1972
Dept. of Psychiatry  1971-1972
Dept. of OB/GYN  1972-1973
U.S. Forest Service  1984-Present
Wilson E. Nolan, Inc.  1984-Present
Predictive Modeling  1986-Present
Oregon Game & Fish Dept.  1986-Present
ISAR - Rwanda, Africa  1986
USAID - Burundi, Africa  1988
MAROC/USAID/MIAC/UN-L Project  1989-Present
NAARP Niger, Africa  1989-Present
ARS - MSEA Water Quality Proj  1990-Present
ICARDA - Syria  1992-Present
ISABU-USAID Burundi, Africa  1992-Present

Professional Societies:

American Statistical Association
Biometric Society
Sigma Xi
American Association for the Advancement of Science
University Statisticians of Southern Experiment Stations (Chairman 1983, 1989)

Refereed Journal Publications:


(with J.R. Clark and D.G. Dombek) Seasonal Variation in Elemental Content of "Bluecrop" Blueberry Leaves. University of Arkansas. Arkansas Agricultural Experiment Station Bulletin 920, 1-12.


(with M. Young and M. Henderson) Attitudes of Nursing Students Toward Patients with AIDS. *Psychological Reports*, 1990, 76, 491-497.


**Invited Papers:**

Exchangeability of Classification Parameters in Multinomial Populations (ASA meetings, 1978)

Design of Transect Studies (Western Biometric Society meetings, 1979)

Agricultural Applications of Kriging (ASA meetings, 1984)

Spatial Variability in Agriculture (USSES meetings, 1985)

Applications of Kriging (Graduate Enrichment Program, University of Kentucky, 1985)

Field Testing of an Abstinence-Oriented Family Life Education Curriculum (American School Health Association, 1989)

Applied Geostatistics Workshop (ASA meetings, 1991)

Designed Experiments in the Presence of Spatial Correlation (networking meeting of Caribbean and Central American Statisticians, Port of Spain, Trinidad, 1992)

Applied Geostatistics Workshop with C.A. Gotway and G.W. Hergert. (ASA meetings, 1992)
Anne M. Parkhurst

Curriculum Vita

Address: Home: 3060 S. 58th
Lincoln, NE 68506
402.483.1884

Work: Department of Biometry
103 Miller Hall
University of Nebraska
Lincoln, NE 68583-0712
402.472.2903

Education:

B.A. 1962 University of Virginia
Mathematics/Chemistry

M.S. 1965 Yale University
Statistics

Ph.D. 1992 University of Nebraska
Industrial Engineering

Thesis:

Evaluation of Order Determination Procedures in Arma Models

Professional Experience:

Research Mathematician Mobil Oil 1965-1966

Statistical Coordinator Cornell University 1966-1969

Senior Systems Analyst University of Nebraska 1969-1972

Instructor University of Nebraska Department of Biometry 1972-1976

Assistant Professor University of Nebraska Department of Biometry 1976-1982

Associate Professor University of Nebraska Department of Biometry 1982-1988

Professor University of Nebraska 1988-Present
Professional Societies:

- Alpha Pi Mu - Industrial Engineering Honor Society
- American Meteorological Society
- American Society of Animal Science
- American Statistical Association
- Biometrics Society
- Chi Beta Phi
- Gamma Sigma Delta
- Graduate Women in Science
- NACTA
- Nebraska Academy of Sciences
- Sigma Xi

Refereed Journal Articles:


This paper received honorable mention at the 30th Annual NACTA Conference, June 1984.


- Book Chapters:


- Abstracts:


Other Publications:

Research Bulletins:


Quarterly Publications:


Book Reviews:


Departmental Reports:


Parkhurst, A.M. "An Account of the Precision Obtained from the Multiple Linear Regression Routines Currently Available at the University of Nebraska." Statistical Laboratory Report #6, 1970.


Proceedings:


Work in Progress:


Kean, Rita and Anne Parkhurst, "Identifying Groups of Apparel Shoppers Among Elderly Women," *Clothing and Textiles Research Journal*.


Wilfred M. Schutz

Curriculum Vita

Address:

Home: 8231 Henry Street
Lincoln, NE 68506
402.489.6992

Office: Central Administration
231 Varner Hall
3835 Holdrege
University of Nebraska
Lincoln, NE 68583
402.472.2861

Education:

B.S. 1957  University of Nebraska  Agronomy
M.S. 1959  University of Nebraska  Genetics
Ph.D. 1962  North Carolina State University  Statistics

Theses:

The effect of thermal neutron irradiation of dormant seeds of maize on the relationship among linked genes controlling qualitative and quantitative characters. M.S. Thesis.


Professional Experience:

Research Geneticist  Agricultural Research Service  1962-1968
U.S. Department of Agriculture
North Carolina University
Department of Genetics
Department of Statistics

Professor and Head  University of Nebraska  1968-1987
Biometrics and Information Systems Center

Director of IANR Computing and AGNET Administrator  University of Nebraska  1975-1987
Assistant V-President and Director of University-wide Computing
Professor

University of Nebraska
Central Administration
1987-present

University of Nebraska
Department of Biometry
Present

Other Academic Experience and University of Nebraska Service:

Graduate Faculty Fellow since 1969
Major Professor on 5 Ph.D. programs and 1 M.S. program, served on 22 Ph.D. and 6 M.S. graduate committees.
Chairman, UNL Academic Planning Committee
Chairman, UNL Conciliation Committee
Chairman, UNL Academic Freedom and Tenure Committee
Chairman, UNL Computational Services and Facilities Committee
Co-Chairman, Chancellor's Task Force on Academic Computing
IANR representative on the University-wide Vice Chancellor's Planning Group for Administrative Computing and Chairman of the subcommittee dealing with financial issues and recommendations.
Chancellor's representative on the University-wide Academic Computing Services Task Force
Chairman, UNL Computer Allocations Committee
Campus Coordinator for the North Central Regional Computer Institute
University-wide Task Force on the Computerization of Financial Aid Operations
Chairman, University-wide Advisory Committee to select and evaluate candidates for the position of Assistant Vice President and Director of University-wide Computing
UNL Chancellor's Committee on Networking
Graduate College Statistics Advisory Committee
Chairman, IANR Computing Advisory Committee
Chairman, IANR Task Force on Policies and Procedures for Software Development and Release
Chairman, IANR Task Force on Expert Systems
Chairman, IANR Department Head's Committee on Graduate Faculty Membership Criteria
Chairman, IANR Patents and Copyrights Advisory Committee
Chairman, Search and Screening Committee for Dean and Director of the Nebraska Agricultural Experiment Station
Chairman, Gamma Sigma Delta Research Awards Selection Committee
Extension Curriculum Committee
Salary Study Committee
Extension Computer Committee
Computers in Agriculture Curriculum Steering Committee
Ag Communications Computer Graphics Committee
Extension Task Force on Data Management
UNL Speaker's Bureau
Task Force on Libraries and Computing for the UNL North Central Accreditation Study
Comprehensive Review Team for the College of Home Economics
Comprehensive Review Team for the Animal Science Department
UNL CALMIT Executive Committee
Associate Editor of *Crop Science* with responsibility for manuscripts with statistical and statistical genetics content

**Professional Societies:**

- American Statistical Association
- Biometrics Society
- American Society of Agronomy
- Crop Science Society of America
- Society of the Sigma Xi
- Gamma Sigma Delta
- Alpha Zeta

**Refereed Journal Articles:**


Abstracts:


Other Publications:


Schutz, W.M. 1969. Inter-genotypic competition--Field plot design and procedures. Proceedings of a Symposium on Soybean Breeding, Iowa State University, Ames, IA.

Schutz, W.M. 1970. Computer as potential aid to better crops. Fall issue, College of Agriculture Farm, Ranch and Home Quarterly Publication.
International Activities:

Presented two invited papers on the applications of computing in agriculture at the First Middle Eastern Computers and Graphics Conference and Exposition in Riyadh, Saudia Arabia in February 1984.

Presented an invited seminar on computing applications at the Regional Agriculture and Water Research Center of the Ministry of Agriculture and Water in Riyadh, Saudi Arabia in February 1984.

Presented seminars on computing applications to visiting teams from the USSR, mainland China, West Germany, Egypt, England, Denmark, and several other foreign countries.
Walter W. Stroup

Curriculum Vita

**Address:**
Home: 1606 Janssen Dr.
Lincoln, NE 68506
402.483.1740

Work: Department of Biometry
103 Miller Hall
University of Nebraska
Lincoln, NE 68583-0712
402.472.2903

**Education:**

B.A. 1973 Antioch College
Psychology
Yellow Springs

M.S. 1975 University of Kentucky
Statistics
Lexington, KY

Ph.D. 1979 University of Kentucky
Statistics
Lexington, KY

**Thesis:**

Maximum likelihood estimation of variance components with the Balanced Incomplete Block Design.

**Professional Experience:**

Teaching Assistant  University of Kentucky  1973-1978
Consulting Assistant  University of Kentucky  1976-1978
Animal Science Department
Assistant Professor  University of Nebraska  1979-1984
Department of Biometry
Associate Professor  University of Nebraska  1984-1992
Department of Biometry
Professor  University of Nebraska  1992-Present
Department of Biometry
Scholastic Honors:

National Merit Finalist, 1968
Natl. Council of Teachers of English Award in English Composition & Creative Writing, 1968
Rotary Club Scholarship Award in Mathematics, 1968
Twice nominated for outstanding teaching award (1982 and 1986)

Professional Societies:

American Statistical Association
Biometric Society
Sigma Xi
University Statisticians of South Experiment Stations
American Society for Horticultural Sciences (assist with statistical issues)
Various university committees and task forces

Refereed Journal Publications:


Abstracts:


Statistical Meetings, American Statistical Association.


Other Publications:


Invited Papers:


February, 1986. Colloquium - "Statistical aspects of cyclic variation in animal feeding behavior," given the departments of Experimental Statistics and Animal Science at Louisiana State University, Baton Rouge, LA.

March, 1988. Colloquium - "Use of Mixed Model Procedures to analysis a class of experiments with Spatial Correlation." Department of Statistics, University of Tennessee-Knoxville.


November, 1988. Colloquium - "Use of Mixed Model Procedure in Experiments with Spatial Effects (with some examples from the MIAC/Morocco Aridoculture Center)." Kansas State University, Manhattan, KS.

October, 1989. "Nearest neighbor adjusted best linear unbiased prediction." Featured talk at South Carolina chapter ASA meetings, Clemson, SC.


Contributed Papers:


February, 1982. SAS User's Group International Meetings. "Use of SAS to analyze experiments conducted over time with multivariate responses and auto-correlated errors."


Proceedings:


International Activities:

Workshops presented:

September, 1986, Settat, Morocco. Introduction to the statistical methods using SYSTAT computing software. Special emphasis on types of data analysis needed at Aridiculture Center of the MIAC/Morocco Dryland Agriculture Project.


October, 1988. Settat, Morocco. Introduction to statistical analysis using PC/SAS.

May, 1989. Settat, Morocco. Advanced topics in statistical analysis using PC/SAS.
August, 1989. Niamey, Niger. Introduction to data management and statistical analysis using PC/SAS. Particular emphasis on the needs of the Niger-American Agricultural Research Project, a joint project of INRAN (Niger agricultural research ministry), Purdue University, and institutions associated with Purdue.

August, 1989. Vienna, Austria. Recent advanced in statistical analysis of field trials with nearest-neighbor effects. With plant breeding group at Agricultural University of Vienna.

June, 1990. Settat, Morocco. Design and analysis of agricultural experiments - with special attention to 1) on-farm trials for farming system research, and 2) experiments with spatial variability (not satisfactorily handled by "conventional methods")

August, 1990. Niamey, Niger. Design and analysis of agricultural experiments - special emphasis on research planning, use of statistical graphics via computer, multi-location experiments, designs for regression (fertilizer, irrigation, etc. experiments).

August, 1992 Bujumbar, Burundi. Design and analysis of agricultural experiments; emphasis on basic biometrical concepts, analysis using SYSTAT, on-farm trials, long-term experiments.
Linda J. (Willson) Young

Curriculum Vita

Address:  Home: 2421 South 78th Street
          Lincoln, NE 68506
          402.483.2392

          Work: Department of Biometry
          University of Nebraska
          103 Miller Hall
          Lincoln, NE 68583-0712
          402.472.2903

Education:

B.S.  1974  West Texas State University  Mathematics

M.S.  1976  West Texas State University  Mathematics

Ph.D. 1981  Oklahoma State University  Statistics

Professional Experience:

Teaching Assistant  Oklahoma State University  1977-1980

Graduate Research Assistant  Oklahoma State University
                            Department of Entomology
                            Summer 1978-79

Graduate Research Assistant  Oklahoma State University
                            Agricultural Experiment Station
                            1980-1981

Assistant Professor  Oklahoma State University
                    Department of Statistics
                    1981-1985

University Summer Faculty  Sandia National Laboratories
                          Statistics, Computing & Human Factors
                          Division 7223
                          Albuquerque, NM
                          1989

Associate Professor  Oklahoma State University
                    Department of Statistics
                    1985-1990

Associate Professor  University of Nebraska
                    Department of Biometry
                    1990-Present
National Science Foundation Conferences:

Sequential Analysis, Oklahoma State University, Summer, 1980.
Mathematical Stochastics of Species Abundance and Community Composition, Oklahoma State University, Spring, 1986.

Professional Societies:

American Statistical Association
Biometrics Society
Entomological Society of America
Institute of Mathematical Statistics
International Society of Ecological Modeling
The Society of Population Ecology

Honors:

Phi Kappa Phi
Sigma Xi
Carl Marshall Award for Outstanding Ph.D. Graduate, Oklahoma State University, 1981.

Formal Courses Taught at Oklahoma State University:

STAT 4013 - Statistical Methods I
STAT 4023 - Statistical Methods II
STAT 4113 - Introduction to Probability Theory
STAT 4203 - Mathematical Statistics I
STAT 4213 - Mathematical Statistics II
STAT 4223 - Statistical Inference
STAT 5013 - Statistics for Experimenters I
STAT 5023 - Statistics for Experimenters II
STAT 5133 - Stochastic Processes
STAT 5513 - Multivariate Analysis
STAT 5053 - Time Series Analysis
STAT 5063 - Multivariate Methods

Formal Courses Taught at University of Nebraska-Lincoln

BIOM 802 - Experimental Design
BIOM 896 - Statistical Ecology
BIOM 896 - Loglinear Models for Categorical Data
BIOM 970 - Linear Models
Grants Received:


Dean's Support Grant, College of Arts and Sciences, Oklahoma State University, 1982-1983.

Dean's Support Grant, College of Arts and Sciences, Oklahoma State University, 1984-1985.


Dean's Incentive Grant for Advanced Faculty, College of Arts and Sciences, Oklahoma State University, 1986-1987.


Dean's Phase II Incentive Grant, College of Arts and Sciences, Oklahoma State University, 1988-1989.


Research Council Travel Grant, University of Nebraska, 1992.

Research Council Distinguished Lecturer Grant, University of Nebraska, 1992.

Proposals Submitted:


Special Travel:

Visited Mexican research stations located near Rio Bravo, Tampico, Tapachula, and USDA stations in Brownsville and Weslaco, TX, July 10-19, 1983. Support provided by International Programs, Oklahoma State University.

Team-taught a class in experimental design to ISABU researchers in Bujumbura, Burundi, January 25-February 2, 1993. Also consulted with ISABU researchers and visited a coffee factory and the coffee laboratory during work on one of the consulting problems related to quality control. Support provided by USAID.
Special Meetings:

Invited Contributor to the Round Table Discussion on Sampling biological populations, environmental monitoring and field testing. Frontiers of Statistical Ecology Program, August 15, 1986. Syracuse, NY.


Leader of Round Table Discussion on How Do Chapters Function on a Tight Budget? Chapter officers Workshop and Reception, August 12, 1993, Boston, MA.

Conferences and Workshops Organized:

National Science Foundation - Conference Board of Mathematical Sciences Regional Research Conference in Mathematical Stochastics of Species Abundance and Community Composition. Stillwater, OK, March 17-21, 1986.


Contributed Papers Presented at Professional Meetings:


development using insect interaction within agroecosystems. Annual Meeting of
Entomological Society of America. December 7-11, Reno, NV.

Willson, Linda J., Jerry H. Young, and J. Alan Stark, 1986. The effect of interaction on
insect movement and distribution within agroecosystems. Annual Meeting of Entomological
Society of America. December 7-11, Reno, NV.

Ha, Sam Bong, Laval M. Verhalen, Jerry H. Young and Linda J. Willson, 1987. Effects of
selected morphological traits in cotton on natural infestations of the cotton fleahopper and
bollworm. 1987 Beltwide Cotton Production Research Conferences. January 4-8, Dallas,
TX.

Young, Jerry H., Linda J. Willson and J. Alan Stark, 1987. The effects of disruption on
cotton insect spatial patterns. 1987 Beltwide Cotton Production Research Conferences.
January 4-8, Dallas, TX.

Willson, Linda J., Jerry H. Young, and J. Alan Stark, 1987. A model of the dynamics of
arthropod movement toward equilibrium. 1987 Beltwide Cotton Production Research
Conferences. January 4-8, Dallas, TX.

movement. 1987 Beltwide Cotton Production Research Conferences. January 4-8, Dallas,
TX.

Young, Jerry H., Linda J. Willson, and Getta Gudavall, 1987. An expert system for cotton
insects in southwestern Oklahoma. Southwestern Branch Meeting of Entomological Society
of America. February 9-11, Austin, TX.

March 22-25, Dallas, TX.

movement. Spring Meeting of the Biometrics Society. March 22-25, Dallas, TX.

Rezay-Garacani, Taghi, Linda J. Willson, and J.H. Young, 1987. A Monte-Carlo study of
multiple comparison procedures applied to discrete data. Spring Meeting of the Biometrics
Society. March 22-25, Dallas, TX.

Chae, S.S., Linda J. Willson, and J.H. Young, 1987. Sequential hypothesis testing for the
mean of a negative binomial distribution, Spring Meeting of the Biometrics Society. March
22-25, Dallas, TX.


Young, Linda J. and Jerry H. Young, 1989. The 2-SPRT as an alternative to Wald's SPRT when testing hypotheses concerning insect populations. Conference on Applied Statistics in Agriculture. May 1-2, Manhattan, KS.


Young, Linda J. and Jerry H. Young, 1990. A spatial view of the negative binomial parameter k when describing insect populations. Kansas State University Conference on Applied Statistics in Agriculture. April 29-May 1, Manhattan, KS.


Invited Papers:


dynamics models of arthropods. Annual Meeting of the International Society of Ecological
Modeling. August 11-15, Gainesville, FL.

Willson, L.J. and J.H. Young, 1985. Some examples of weighted distributions in
entomological studies. Advanced Research Conference on Weighted Distributions and
Related Methods. November 9-13, University Park, PA.

SRCOS/ASA Summer Research Conference. June 16-20, Mobile, AL.

Young, L.J. and J.H. Young, 1988. The application of urn models to the study of insect
distribution. Statistics Symposium at the University of Missouri-Columbia. November 15,
Columbia, Missouri.

Young, Linda J. and Jerry H. Young, 1989. The case for and against statistical hypothesis
testing. North Central Branch Meeting of Entomological Society of America. March 12-15,
Indianapolis, IN.

Young, Linda J. and Jerry H. Young, 1990. Is there any such thing as randomness?
Symposium on Chaos in Biological and Agricultural Systems: The Statistical Issues. June 3-
6, Lincoln, NE.

Young, Linda J. and Jerry H. Young, 1991. New approaches in insect dispersal models
compared to classical approaches. Joint Statistical Meetings. August 18-22, Atlanta, GA.

Refereed Publications:

Willson, Linda J. and Leroy Folks, 1983. Sequential estimation of the mean of the negative
binomial distribution. Sequential Analysis 2:55-70.


Willson, L.J., J.L. Folks, and J.H. Young, 1984. Multistage estimation compared with

Young, J.H. and L.J. Willson, 1984. A model to predict damage reduction to flower buds
or fruit by Heliothis spp. in the absence or presence of two Coleoptera predators. The
Southwestern Entomologist 9:33-38.

temperature on development and survival of the elm leaf beetle Pyrrhalta luteola (Muller).
Environmental Entomology 14:272-274.


**Papers Under Review:**


Young, Linda J. 1993. Computation of some exact properties of Wald's SPRT when sampling from a class of discrete distributions. Submitted to *Biometrical Journal*.


Young, Linda J., Mark E. Payton, and Jerry H. Young. A model of insect sexual preference based on an extension of Polya's urn model. Submitted to *Journal of Applied Probability*.

**Papers Under Preparation:**

Rezay-Garacani, Taghi, Linda J. Young and J.H. Young. A Monte-Carlo study of multiple comparison procedures applied to discrete data. To be submitted to *Communications in Statistics*.

Young, Linda J. and Robert G. Easterling. Estimation of extreme percentiles based on sensitivity tests. To be submitted to *Technometrics*.

Nagardeolekar, Madhuri S. and Linda J. Young. Approximations for a fixed sample size selection procedure for negative binomial populations. To be submitted to *Communications in Statistics*.

Payton, Mark E., Linda J. Young, and J.H. Young. An exact analysis of sequential sampling from a binomial distribution with three alternative hypotheses. To be submitted to *Journal of the Royal Statistical Society, Series B*.

Young, J.H. and L.J. Young. Spatial relationships of predator and prey of cotton insects. To be submitted to *Entomophaga*.

Young, Linda J. and Jerry H. Young. Further considerations in the use of Wald’s SPRT. To be submitted to *Economic Entomology*.

Young, Linda J. and Jerry H. Young. The 2-SPRT: Comparisons with Wald’s SPRT. To be submitted to *Environmental Entomology*.

Young, Linda J., Madhuri S. Mulekar, and Mark E. Payton. Corrections factors needed for the 2-SPRT. To be submitted to *Annals of Statistics*.

Young, Linda J. and Linda A. Pavlish. Jackknifing and bootstrapping for the negative binomial parameter k. To be submitted to *Biometrics*. 
Other Publications:

Young, J.H., L.J. Willson and M.A. Strabala, 1983. Temperature and its effect on cotton and cotton insects. Research report, Agricultural Experiment Station, Oklahoma State University, Stillwater, OK.


Young, J.H., Linda Willson and Ken Pinkston, 1983. Sequential sampling for predators in cotton. Current report, Agricultural Experiment Station, Oklahoma State University, Stillwater, OK.


Chapters in Books:


Books in Preparation:

Young, Jerry H. and Linda J. Young, Arthropod Population Dynamics. A draft copy of the text has been used at Oklahoma State University during the 1986-1990 Spring semesters. It is currently being revised and will be submitted for publication.

Young, Linda J. and Jerry H. Young, Statistical Ecology. Contracted with Chapman-Hall for a 1995 anticipated publication date.

Biometry Department Faculty. Biological Data Sets with Emphasis on Experimental Design. Contracted with Chapman-Hall for a 1994 anticipated publication date.

Service Function:

Oklahoma State University

Departmental:
Undergraduate Advisor, 1981-1985
Awards Committee, 1981-1987
Chairman of Awards Committee, Fall 1982; 1983-1986
Personnel Committee, 1985-1990
Sponsor of Statistics Club, 1985-1986
Seminar Coordinator, 1985-1990
Graduate Committee, 1985-1986; 1988-1990
Computer Committee, 1988-1990
Presently supervise one doctoral student

University and Within State:
Phi Kappa Phi Scholarship Committee, Oklahoma State University, 1982-1983
Phi Kappa Phi Information Officer, Oklahoma State University, 1983-1986.
College of Arts and Science Honors Committee, Oklahoma State University, 1984-1987.
Chair of Curriculum and Research Committee of Women's Council, Oklahoma State University, 1987-1988.
Vice-President of Women's Council, Oklahoma State University, 1988-1989.

University of Nebraska:

Department of Biometry:
  Seminar Chairman, 1990-1992
  Curriculum Committee, 1990-Present
  Graduate Committee, 1990-Present

University:
  Member of Faculty Advisory Council for the College of Agriculture and Natural Resources, University of Nebraska-Lincoln. 1991-1993.
  Currently serve on 8 Master's Committees and 6 Ph.D. Committees.

American Statistical Association:
  Vice-President for Academic Affairs, Oklahoma Chapter of American Statistical Association, 1982.
  Member of the ASA-NCTM Joint Committee on the Curriculum in Statistics and Probability, 1992-94.
  Member of American Statistical Association's Technical Advisory Committee for the Environmental Protection Agency's Statistical Consulting Center. (Because this is a new ASA committee and I am only recently appointed, I do not know the length of service at this time.)
  Member of the Publications Committee of the Statistics and the Environment Section of ASA, 1991-present.
  Organizer and Chair of a Special Session. 1993 Joint Statistical Meetings, San Francisco, CA.
  Coordinator of Judging and Judge of the 1993 ASA Project Competition. (Nebraska chapter has responsibility for the judging in 1993-1994.)
  Work with third graders at Pyrtle Elementary School in Lincoln, NE, as they prepare posters for the 1993 ASA Poster Competition.
Member and Chair on an ad hoc Committee for Proposing a Journal with Emphasis on Statistical Applications in the Biological Sciences. The Board of Directors approved the proposal in August, 1992.

International Biometric Society and Eastern North American Region (ENAR):

Member of the Scientific Program Committee for the 1994 International Biometrics Conference.
Representative for the ENAR to the Elizabeth Scott Award Committee, 1992.
Biometrics Section ASA Representative to ENAR for the 1994 Spring Meetings Program Committee.

Current Index to Statistics:

Contributing Editor to Current Index to Statistics, 1987-present.
Editorial Collaborator to Current Index to Statistics, 1986.

Technical Committee:


Reviewer/Referee:

Journal articles have been reviewed for the following journals:
Biometrics
Communications in Statistics, Simulation and Computation
The American Statistician
Journal of Economic Entomology
Canadian Entomologist
Ecology
Journal of Statistical Computation and Simulation
Environmental Entomology
Technometrics
Statistics and Probability Letters

Reviewed National Science Foundation proposals for the Probability and Statistics Program and the Ecosystems Program.

Reviewed several books on inference, statistical methods and experimental design.
Masters Students Advised:


Maria Ana Ebron Obejar, 1986. Predicting Rates of Parasitism and Encapsulation of Bathypectes spp. in the Alfalfa Weevil. Oklahoma State University.


Ph.D. Students Advised:


### Table 1
Academic Program Review
Department of Biometry
Average Faculty Salaries and Average Years in Rank
By Rank, 1987-88 and 1991-92

<table>
<thead>
<tr>
<th>RANK</th>
<th>Biometry</th>
<th>Overall UNL (Includes Library)</th>
<th>Overall UNL (Excludes Library)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Faculty</td>
<td>Av. Yrs. in Rank</td>
<td>Ave. Salary</td>
</tr>
<tr>
<td>Professor</td>
<td>2</td>
<td>6.0</td>
<td>34,445</td>
</tr>
<tr>
<td>Associate</td>
<td>2</td>
<td>6.5</td>
<td>29,828</td>
</tr>
<tr>
<td>Assistant</td>
<td>1</td>
<td>1.0</td>
<td>22,146</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RANK</th>
<th>Biometry</th>
<th>Overall UNL (Includes Library)</th>
<th>Overall UNL (Excludes Library)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Faculty</td>
<td>Av. Yrs. in Rank</td>
<td>Ave. Salary</td>
</tr>
<tr>
<td>Professor</td>
<td>2</td>
<td>2.5</td>
<td>57,298</td>
</tr>
<tr>
<td>Associate</td>
<td>2</td>
<td>6.5</td>
<td>46,376</td>
</tr>
<tr>
<td>Assistant</td>
<td>2</td>
<td>1.5</td>
<td>36,050</td>
</tr>
</tbody>
</table>

Source: UNL Faculty Salary Study Committee file for above years. Twelve-month salaries have been converted to academic year using .75 as a conversion factor.

The 1987-88 and 1991-92 Faculty Salary Study files exclude Deans and other administrative salaries and include chairpersons. Comparisons between 1987-88 and 1991-92 must be drawn with caution. The following changes were initiated in 1988-89 as a result of the University's conversion to the new MSA accounting system. In addition, some inconsistencies with UNL's AAU comparator group were rectified. Moving to an October 1 reporting date provides a more complete data base than has been used in the past.

1987-88
Includes faculty having .50 or greater FTE, ranked as instructor and above. These are converted to 1.00 FTE.
Named Professorship stipends are excluded.
Salaries are based on July 1 budget.

1988-89 to Present
Included faculty having 1.00/greater FTE, ranked as instructor and above.
Named Professorship stipends are included.
Salaries based on faculty who are active as of October.
Table 2

Academic Program Review
Department of Biometry
Comparison of Average Faculty Salaries by Rank
With Current Comparator Group
Academic Year 1991-92

<table>
<thead>
<tr>
<th>Institution</th>
<th>Professor</th>
<th>Associate</th>
<th>Assistant</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Average</td>
<td>Total</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Salary</td>
<td>Number</td>
<td>Salary</td>
</tr>
<tr>
<td>Current Comparator Group</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Univ. of Nebr. Lincoln</td>
<td>2</td>
<td>57,298</td>
<td>2</td>
<td>46,376</td>
</tr>
<tr>
<td>Difference</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Percent Change</td>
<td>Required to</td>
<td>Meet the</td>
<td>Comparator</td>
<td>Group</td>
</tr>
</tbody>
</table>

The Faculty Salary Study file includes those have a 1.00 FTE, ranked as instructor and above. Deans and other academic administrative salaries are excluded, departmental chairpersons are included. Regents Professorship stipends are included. All personnel and salaries are taken from the October 1 personnel data tape. Note: The ten comparator institutions are: University of Minnesota, Purdue University, University of Missouri, Ohio State University, University of Illinois, Iowa State University, University of Iowa, Colorado State University, University of Colorado, and University of Kansas.

Table 3A
Academic Program Review
Department of Biometry
Budgeted FTE Teaching Staff
1988-89 To 1992-93

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>2.20</td>
<td>2.45</td>
<td>2.55</td>
<td>2.10</td>
<td>2.45</td>
<td>11.36</td>
<td>16.67</td>
</tr>
<tr>
<td>Other A-Line</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Managerial/Professional</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Clerical/Tech/Service</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Graduate Assistant</td>
<td>0.70</td>
<td>0.70</td>
<td>0.70</td>
<td>1.20</td>
<td>2.70</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Other hourly</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>TOTAL FTE STAFF</td>
<td>4.44</td>
<td>4.69</td>
<td>4.79</td>
<td>5.34</td>
<td>6.69</td>
<td>5.63</td>
<td>8.06</td>
</tr>
</tbody>
</table>

Source: UNL General Operating Budget for above years as of July 1. It includes unfilled lines and thus not all FTE budgeted are available for instruction. This table includes only account LGE/61-237-01.
### Table 3B
Academic Program Review
Department of Biometry
Budgeted FTE Research Staff
1988-89 To 1992-93

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>2.20</td>
<td>2.10</td>
<td>2.85</td>
<td>3.30</td>
<td>3.95</td>
<td>79.55</td>
<td>19.70</td>
</tr>
<tr>
<td>Other A-Line</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Managerial/Professional</td>
<td>1.60</td>
<td>1.60</td>
<td>1.76</td>
<td>1.76</td>
<td>1.76</td>
<td>10.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Clerical/Tech/Service</td>
<td>1.52</td>
<td>1.52</td>
<td>1.45</td>
<td>1.45</td>
<td>1.45</td>
<td>(4.61)</td>
<td>0.00</td>
</tr>
<tr>
<td>Graduate Assistant</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>2.80</td>
<td>2.80</td>
<td>2,900.00</td>
<td>2,900.00</td>
</tr>
<tr>
<td>Other hourly</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>TOTAL FTE STAFF</strong></td>
<td><strong>5.65</strong></td>
<td><strong>5.55</strong></td>
<td><strong>6.39</strong></td>
<td><strong>9.61</strong></td>
<td><strong>10.26</strong></td>
<td><strong>47.96</strong></td>
<td><strong>22.22</strong></td>
</tr>
</tbody>
</table>

Source: UNL General Operating Budget for above years as of July 1. It includes unfilled lines and thus not all FTE budgeted are available for instruction. This table includes only account LGE/62-237-01.
Table 3D
Academic Program Review
Department of Biometry - TOTAL
Budgeted FTE Staff
1988-89 To 1992-93

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>4.40</td>
<td>4.55</td>
<td>5.40</td>
<td>5.40</td>
<td>6.40</td>
<td>45.45</td>
<td>18.52</td>
</tr>
<tr>
<td>Other A-Line</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Managerial/Professional</td>
<td>1.85</td>
<td>1.85</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>8.11</td>
<td>0.00</td>
</tr>
<tr>
<td>Graduate Assistant</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>1.60</td>
<td>119.18</td>
<td>119.18</td>
</tr>
<tr>
<td>Other hourly</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: UNL General Operating Budget for above years as of July 1. It includes unfilled lines and thus not all FTE budgeted are available for instruction. This table includes account LGE/61-237-01, LGE/62-237-01, and LGE/62-237-70.
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>186,884</td>
<td>123,879</td>
<td>2.50</td>
<td>981</td>
<td>392.40</td>
<td>126.28</td>
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<tr>
<td>1989-90</td>
<td>222,686</td>
<td>153,903</td>
<td>2.75</td>
<td>965</td>
<td>350.91</td>
<td>159.48</td>
</tr>
<tr>
<td>1990-91</td>
<td>250,587</td>
<td>173,462</td>
<td>2.85</td>
<td>1,235</td>
<td>433.33</td>
<td>140.46</td>
</tr>
<tr>
<td>1991-92</td>
<td>232,129</td>
<td>155,376</td>
<td>2.40</td>
<td>1,291</td>
<td>537.92</td>
<td>120.35</td>
</tr>
<tr>
<td>1992-93</td>
<td>263,280</td>
<td>181,640</td>
<td>2.75</td>
<td>1,490</td>
<td>541.82</td>
<td>121.91</td>
</tr>
</tbody>
</table>

% Change from 1988-89 to 1992-93  40.88  46.63  10.00  51.89  38.08  (3.46)

% Change from 1991-92 to 1992-93  13.42  16.90  14.58  15.41  0.73  1.29

Source: UNL General Operating Budget for above years as of July 1. Total dollars include staff salaries and wages, benefits, operating expenses and equipment. Budgeted A-line dollars exclude staff benefits. Total budgeted dollars and budgeted A-Line dollars and FTE may include dollars for unfilled positions. This table includes only account LGE/61-237-01.
### Table 4B

**Academic Program Review**

**Department of Biometry**

**Budgeted Dollars, A-Line FTE, Budget Per SCH, and SCH/Budgeted A-Line FTE**

1988-89 - 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Budgeted Dollars</th>
<th>Budgeted A-Line Dollars</th>
<th>Budgeted A-Line FTE</th>
<th>SCH/Budgeted Academic Year</th>
<th>SCH/Budgeted A-Line FTE</th>
<th>A-Line Budgeted Dollars/SCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>240,480</td>
<td>123,880</td>
<td>2.50</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1989-90</td>
<td>266,412</td>
<td>138,079</td>
<td>2.40</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1990-91</td>
<td>329,260</td>
<td>185,743</td>
<td>3.15</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1991-92</td>
<td>410,912</td>
<td>245,869</td>
<td>3.60</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1992-93</td>
<td>450,845</td>
<td>261,495</td>
<td>4.25</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

% Change from
1988-89 to 1992-93 87.48 111.09 70.00 -- -- --

% Change from

Source: UNL General Operating Budget for above years as of July 1. Total dollars include staff salaries and wages, benefits, operating expenses and equipment. Budgeted A-line dollars exclude staff benefits. Total budgeted dollars and budgeted A-line dollars and FTE may include dollars for unfilled positions. This table includes only account LGE/62-237-01.
Table 4C
Academic Program Review
Department of Biometry - Statistical Services
Budgeted Dollars, A-Line FTE, Budget Per SCH, and SCH/Budgeted A-Line FTE
1988-89 - 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Budgeted Dollars</th>
<th>Budgeted A-Line Dollars</th>
<th>Budgeted A-Line FTE</th>
<th>SCH/Budgeted Academic Year</th>
<th>SCH/Budgeted A-Line FTE</th>
<th>A-Line Budgeted Dollars/SCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>43,585</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1989-90</td>
<td>45,170</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1990-91</td>
<td>49,543</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1991-92</td>
<td>50,926</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1992-93</td>
<td>29,372</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

% Change from 1988-89 to 1992-93 (32.61)
% Change from 1991-92 to 1992-93 (42.32)

Source: UNL General Operating Budget for above years as of July 1. Total dollars include staff salaries and wages, benefits, operating expenses and equipment. Budgeted A-line dollars exclude staff benefits. Total budgeted dollars and budgeted A-line dollars and FTE may include dollars for unfilled positions. This table includes only account LGE/62-237-70.
Table 4D
Academic Program Review
Department of Biometry - Total
Budgeted Dollars, A-Line FTE, Budget Per SCH, and SCH/Budgeted A-Line FTE
1988-89 - 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Budgeted Dollars</th>
<th>Budgeted A-Line Dollars</th>
<th>Budgeted A-Line FTE</th>
<th>SCH/Academic Year</th>
<th>SCH/Budgeted A-Line FTE</th>
<th>A-Line Budgeted Dollars/SCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>470,949</td>
<td>247,759</td>
<td>5.00</td>
<td>981</td>
<td>196.20</td>
<td>252.56</td>
</tr>
<tr>
<td>1989-90</td>
<td>534,268</td>
<td>291,982</td>
<td>5.15</td>
<td>965</td>
<td>187.38</td>
<td>302.57</td>
</tr>
<tr>
<td>1990-91</td>
<td>629,390</td>
<td>359,205</td>
<td>6.00</td>
<td>1,235</td>
<td>205.83</td>
<td>290.85</td>
</tr>
<tr>
<td>1991-92</td>
<td>693,967</td>
<td>401,245</td>
<td>6.00</td>
<td>1,291</td>
<td>215.17</td>
<td>310.80</td>
</tr>
<tr>
<td>1992-93</td>
<td>743,497</td>
<td>443,135</td>
<td>7.00</td>
<td>1,490</td>
<td>212.86</td>
<td>297.41</td>
</tr>
</tbody>
</table>

% Change from 1988-89 to 1992-93: 57.87% 78.86% 40.00% 51.89% 8.49% 17.76%

% Change from 1991-92 to 1992-93: 7.14% 10.44% 16.67% 15.41% (1.07%) (4.31%)

Source: UNL General Operating Budget for above years as of July 1. Total dollars include staff salaries and wages, benefits, operating expenses and equipment. Budgeted A-line dollars exclude staff benefits. Total budgeted dollars and budgeted A-line dollars and FTE may include dollars for unfilled positions. This table includes account LGE/61-237-01, LGE/62-237-01, and LGE/62-237-70.
Table 3C
Academic Program Review
Department of Biometry-Statistical Services
Budgeted FTE Staff (Revolving)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other A-Line</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Managerial/Professional</td>
<td>0.25</td>
<td>0.25</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>(4.00)</td>
<td>0.00</td>
</tr>
<tr>
<td>Clerical/Tech/Service</td>
<td>2.03</td>
<td>2.03</td>
<td>1.80</td>
<td>0.80</td>
<td>0.80</td>
<td>(60.59)</td>
<td>(55.56)</td>
</tr>
<tr>
<td>Graduate Assistant</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other hourly</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>TOTAL FTE STAFF</td>
<td>2.28</td>
<td>2.28</td>
<td>2.04</td>
<td>2.04</td>
<td>1.04</td>
<td>(54.39)</td>
<td>(49.02)</td>
</tr>
</tbody>
</table>

Source: UNL General Operating Budget for above years as of July 1. It includes unfilled lines and thus not all FTE budgeted are available for instruction. This table includes only account LGE/62-237-70.
### Table 5

**Academic Program Review**  
Department of Biometry  
Number of Course Sections, Registrations  
Average Class Size, and Student Credit Hours  
Fall Semesters 1988-89 and 1992-93

<table>
<thead>
<tr>
<th>Course Number</th>
<th>No. of Sections</th>
<th>Registrations</th>
<th>Average Class Size</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>801</td>
<td>1</td>
<td>64</td>
<td>64</td>
<td>256</td>
</tr>
<tr>
<td>802</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>896A</td>
<td>1</td>
<td>19</td>
<td>19</td>
<td>57</td>
</tr>
<tr>
<td>896B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>896C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901A</td>
<td>1</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>901B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>970</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>162</td>
<td>32</td>
<td>392</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Number</th>
<th>No. of Sections</th>
<th>Registrations</th>
<th>Average Class Size</th>
<th>Student Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>801</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>802</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>896A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>896B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>896C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901C</td>
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</tr>
<tr>
<td>970</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>175</td>
<td>22</td>
<td>629</td>
</tr>
<tr>
<td>Year</td>
<td>Total</td>
<td>Lower Level</td>
<td>Upper Level</td>
<td>Graduate &amp; Professional</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td># of Regis.</td>
<td>Credit Hours</td>
<td>Contact Hours</td>
<td># of Regis.</td>
</tr>
<tr>
<td>1988-89</td>
<td>162</td>
<td>392</td>
<td>456</td>
<td>-</td>
</tr>
<tr>
<td>1989-90</td>
<td>145</td>
<td>390</td>
<td>451</td>
<td>-</td>
</tr>
<tr>
<td>1990-91</td>
<td>221</td>
<td>330</td>
<td>384</td>
<td>-</td>
</tr>
<tr>
<td>1991-92</td>
<td>291</td>
<td>579</td>
<td>946</td>
<td>-</td>
</tr>
<tr>
<td>1992-93</td>
<td>175</td>
<td>629</td>
<td>733</td>
<td>13</td>
</tr>
</tbody>
</table>

% Change from 1988-89 to 1992-93:
- Total: 8.0, 60.5, 60.7
- Lower Level: -
- Upper Level: -
- Graduate & Professional: 0.0, 50.5, 52.2

Source: Analysis of Course Offerings, Class Size, Teaching Load, and Credit Hour Costs, Fall Semester 1988-89 through 1992-93 (Tables 7,103,203), Office of Institutional Research and Planning.
Table 7
Academic Program Review
Department of Biometry
Student Credit Hours Per FTE Instructional Faculty By Level
Fall Semesters 1988-89 to 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Lower Level</th>
<th>Upper Level</th>
<th>Graduate &amp; Profession</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FTE Instr. Faculty</td>
<td>SCH</td>
<td>SCH/FTE</td>
<td>FTE Instr. Faculty</td>
</tr>
<tr>
<td>1988-89</td>
<td>1.49</td>
<td>392</td>
<td>263.1</td>
<td>-</td>
</tr>
<tr>
<td>1989-90</td>
<td>2.71</td>
<td>390</td>
<td>143.9</td>
<td>-</td>
</tr>
<tr>
<td>1990-91</td>
<td>2.64</td>
<td>530</td>
<td>200.8</td>
<td>-</td>
</tr>
<tr>
<td>1991-92</td>
<td>3.04</td>
<td>579</td>
<td>190.5</td>
<td>-</td>
</tr>
<tr>
<td>1992-93</td>
<td>3.32</td>
<td>629</td>
<td>189.5</td>
<td>0.65</td>
</tr>
<tr>
<td>% Change from 1988-89 to 1992-93</td>
<td>122.8</td>
<td>60.5</td>
<td>(28.0)</td>
<td>-</td>
</tr>
<tr>
<td>% Change from 1991-92 to 1992-93</td>
<td>9.2</td>
<td>8.6</td>
<td>(0.5)</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Analysis of Course Offerings, Class Size, Teaching Load, and Credit Hour Costs, Fall Semesters, 1988-89 through 1992-93 (Tables 105, 103, and 107), Office of Institutional Research and Planning.
Table 7A
Academic Program Review
Department of Biometry
Student Credit Hours Per FTE Instructional Faculty By Level
(Graduate Assistants Excluded)
Fall Semesters 1988-89 to 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Total FTE Instr.</th>
<th>Total SCH/FTE</th>
<th>Lower Level FTE Instr.</th>
<th>Lower Level SCH/FTE</th>
<th>Upper Level FTE Instr.</th>
<th>Upper Level SCH/FTE</th>
<th>Graduate &amp; Profession FTE Instr.</th>
<th>SCH/FTE</th>
<th>SC</th>
<th>FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>1.16</td>
<td>392</td>
<td>337.9</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.16</td>
<td>392</td>
<td>33</td>
<td>18</td>
</tr>
<tr>
<td>1989-90</td>
<td>2.13</td>
<td>390</td>
<td>183.1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2.13</td>
<td>390</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>1990-91</td>
<td>2.39</td>
<td>530</td>
<td>221.8</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2.39</td>
<td>530</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>1991-92</td>
<td>2.30</td>
<td>555</td>
<td>241.3</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2.30</td>
<td>555</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td>1992-93</td>
<td>2.23</td>
<td>590</td>
<td>264.6</td>
<td>0.35</td>
<td>--</td>
<td>--</td>
<td>1.88</td>
<td>590</td>
<td>31</td>
<td>--</td>
</tr>
</tbody>
</table>

% Change from 1988-89 to 1992-93: 92.2 50.5 (21.7)
% Change from 1991-92 to 1992-93: (3.0) 6.3 9.6

Source: Analysis of Course Offerings, Class Size, Teaching Load, and Credit Hour Costs, Fall Semesters, 1988-89 through 1992-93 (Tables 105A, 103A, and 107A), Office of Institutional Research and Planning.
### Table 8
Academic Program Review
Department of Biometry
Direct Instructional Salary Cost Per Student Credit Hour
Fall Semesters 1988-89 - 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost Per SCH</th>
<th>Fall Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>57.49</td>
<td>392</td>
</tr>
<tr>
<td>1989-90</td>
<td>106.81</td>
<td>390</td>
</tr>
<tr>
<td>1990-91</td>
<td>98.73</td>
<td>530</td>
</tr>
<tr>
<td>1991-92</td>
<td>99.84</td>
<td>579</td>
</tr>
<tr>
<td>1992-93</td>
<td>97.83</td>
<td>629</td>
</tr>
</tbody>
</table>

% Change From
1988-89 to 1992-93: 70.17%
% Change From
1991-92 to 1992-93: (2.01)%

Note: The cost represents an allocation of direct salary costs to instruction. Half of the academic year salary has been allocated to the first semester. Salaries have been prorated on the basis of the semester load of each individual instructional staff member, including graduate teaching assistants. The total instructional salary cost was then divided by the number of student credit hours to obtain the "Cost Per SCH."

Source: Analysis of Course Offerings, Class Size, Teaching Load, and Credit Hour Costs, Fall Semesters 1988-89 through 1992-93, Office of Institutional Research and Planning (Tables 110, 103)
Table 9
Academic Program Review
Department of Biometry
Student Registrations in the Department by College
Fall Semesters 1988-89 to 1992-93

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agric. Sci. &amp; Nat. Res.</td>
<td>1</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>14</td>
</tr>
<tr>
<td>Architecture</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Arts &amp; Sciences</td>
<td>2</td>
<td>--</td>
<td>2</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Business Admin.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Engineering</td>
<td>--</td>
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<td>--</td>
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</tr>
<tr>
<td>Graduate</td>
<td>157</td>
<td>144</td>
<td>216</td>
<td>289</td>
<td>160</td>
</tr>
<tr>
<td>Home Economics</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<tr>
<td>Law</td>
<td>--</td>
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<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Teachers</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Others &amp; Undeclared</td>
<td>2</td>
<td>--</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>162</strong></td>
<td><strong>145</strong></td>
<td><strong>221</strong></td>
<td><strong>291</strong></td>
<td><strong>175</strong></td>
</tr>
</tbody>
</table>

Source: Statistics registration tape as of the sixth day of enrollment for above years.
Table 10
Academic Program Review
Department of Biometry (Code 102)
Number of Departmental Majors
1988-89 To 1992-93

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
<th>Unclassified</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
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</tr>
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<tr>
<td>% Change from 1988-89 to 1992-93</td>
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NOTE: Majors included are: 102, Biometry. This was a new major in Fall 1991-92.

Source: Enrollment by Major, Undergraduate and Graduate, Office of Institutional Research and Planning.
Table 10
Academic Program Review
Majors in Biometry (Code 102)
1988-89 to 1992-93

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</tr>
</tbody>
</table>

% Change in Total from 1988-89 to 1991-92
% Change in Total from 1991-92 to 1992-93

*Indicates number of students in the category who are non-resident aliens for 1989-90 through 1991-92. Information not available by race or non-resident alien status prior to 1989.

Note: Majors included are 102, Biometry.
Source: Profiles for above fall semesters, Office of Institutional Research and Planning.
Table 12 is a listing of faculty in the department of Biometry. The following information gives an explanation of some column headings:

**AFTE** administrative FTE  
**FFTE** faculty FTE  

**G**  
**F** Grad Faculty Status  

**F**  
**P** Full or Part Time  

**R**  
**T** Regular or Temporary

**Deg** Refers to PDF Education Codes:  
- 01 Less than high school graduation  
- 02 High school graduate or equivalent  
- 03 Trade Certificate  
- 04 1-2 years beyond high school  
- 05 Associate degree or equivalent  
- 06 Professional certificate  
- 07 3-4 years beyond high school  
- 08 Bachelors degree  
- 09 Masters degree  
- 10 J.D., L.L.B.  
- 11 6 years specialization  
- 12 Doctoral candidate  
- 13 All but dissertation  
- 14 Doctoral degree  
- 00 Other

**FTE**  
DCS First line is FTE, second line shows FTE in Division of Continuing Studies

**Bud-Sal** Salary  
**Adj-Sal** Ignore this column

**Prof** shows whether or not they have a professorship

**Appt** 9 or 12 month appointment (0=12 mo., 1 or 2 = 9 mo.)

**Blank** 12 Months Job Paid Over 12 Months  
01 Academic Year Paid Over 9 Months  
02 Academic Year Paid Over 12 Months  
03 Ten Months Paid Over 10 Months  
04 Ten Months Paid Over 12 Months  
05 Summer Session  
06 Fall Semester  
07 Spring Semester
Explanation of Table 12 (Continued)
08 Other
09 Spring Semester Paid Over 8 months

**Term** Appointment amount indicator (Annual amount to be paid)

AA--Total is annual salary for an academic year or all-year appointment

AP--Total Payment for period of the appointment. Used for appointment other than academic-year and all year appointments.
<table>
<thead>
<tr>
<th>NAME</th>
<th>TENURE</th>
<th>SSN</th>
<th>MODIFIER</th>
<th>TITLE</th>
<th>G - F</th>
<th>E</th>
<th>T</th>
<th>H</th>
<th>R</th>
<th>P</th>
<th>O</th>
<th>X</th>
<th>D</th>
<th>TITLE-DT</th>
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<th>TENURE</th>
<th>FTE</th>
<th>BUD_SAL</th>
<th>ADJ_SAL_FTE</th>
<th>PROF</th>
<th>APPT</th>
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<td>F</td>
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<td>R</td>
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<td>2</td>
<td>F</td>
<td>09</td>
<td>03/01/49</td>
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Table 13  
Academic Program Review  
Department of Biometry  
Majors by Full and Part Time, Gender, and Age  
Fall Semester 1992-93  

<table>
<thead>
<tr>
<th>Major and Gender</th>
<th>Age of Students</th>
<th>Full-Time</th>
<th>Part-Time</th>
<th>Total Full &amp; Part</th>
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<td>Men</td>
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<td>Women</td>
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<tr>
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</table>

Source: Fall Semester 1992-1993 Profiles, Office of Institutional Research and Planning
### Table 14

**Academic Program Review**  
Department of Biometry  
Student Credit Hours by Course Level  
and the Instructional Staff Teaching the Courses  

<table>
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<th>Fall Semester</th>
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<th>700</th>
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</table>

**Note:** Credit is assigned according to the home department of the instructional staff who teach the courses.  
**Source:** Profiles for above years, Table A50.