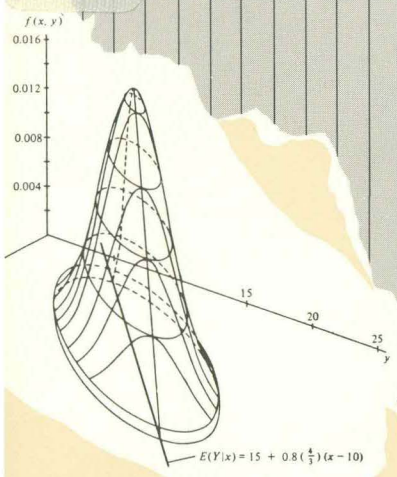


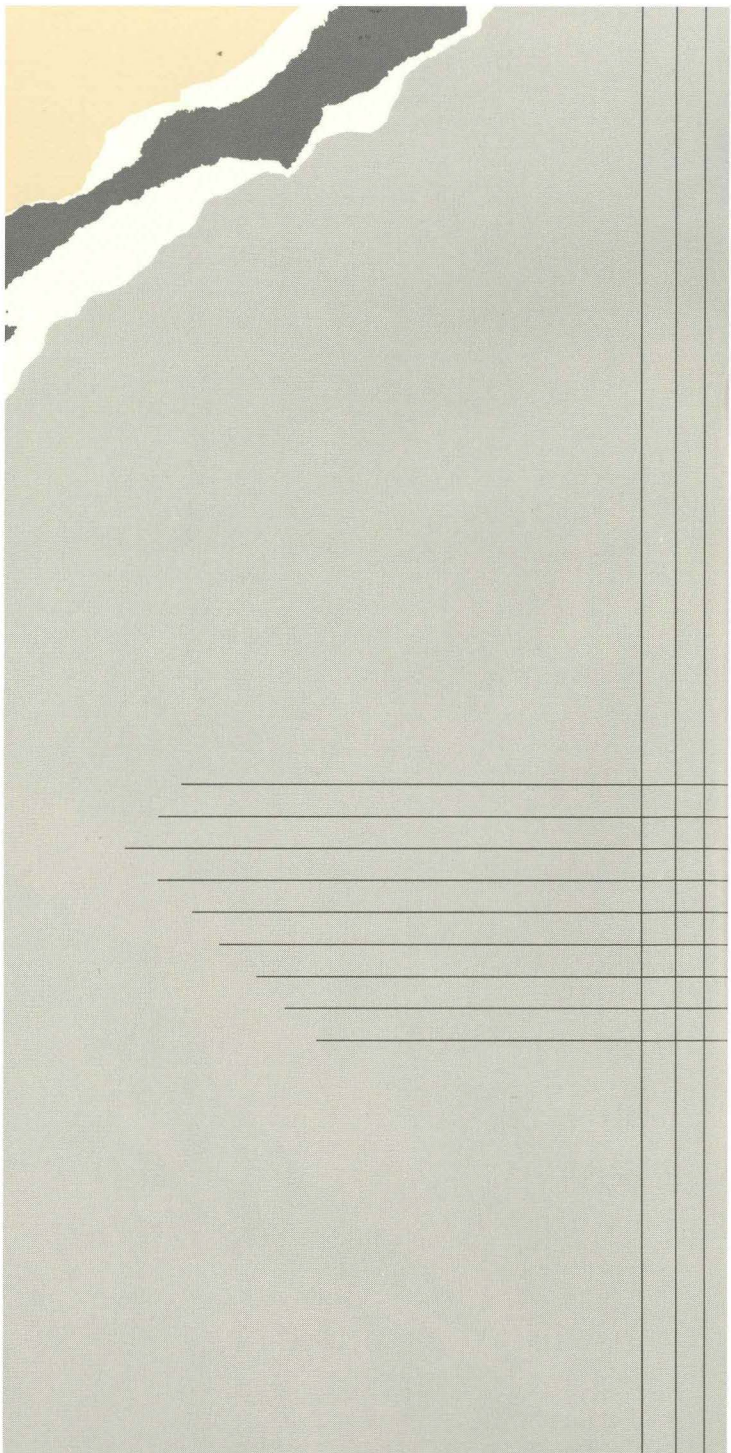
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STATISTICS AND ACTUARIAL SCIENCE



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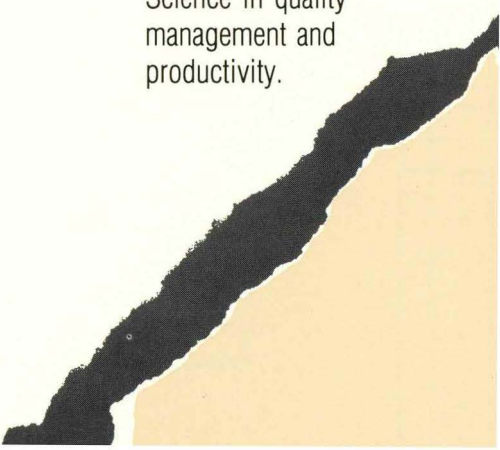


Cover Art:
From Hogg and Tanis' book, *Probability
and Statistical Inference*.



S

tistics and Actuarial
Science at The
University of Iowa
offers programs
leading to a
Doctor of Philosophy
in statistics, a
Master of Science in
statistics,
a Master of Science
in actuarial science,
and a Master of
Science in quality
management and
productivity.





CAREER OPPORTUNITIES

Applied statisticians work with scientists and decision makers to collect, analyze, and interpret data. They apply their skills to marketing, manufacturing, education, research and development, agriculture, law, public policy, science, and medicine.

Theoretical statisticians conduct research to develop new methodologies and statistical theory usually using high level mathematics.

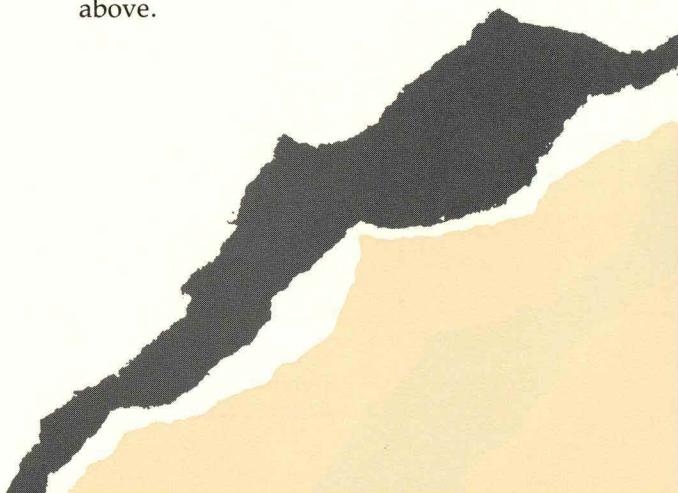
Thousands of statisticians in the U.S. are employed by private industry and the federal government. Many others are involved in teaching and research. The National Science Foundation predicts that for the next decade demand for trained statisticians will exceed supply.

Actuaries specialize in the evaluation of risk. This is most often done in the context of life, health, and casualty insurance and employee benefits where the actuary designs, analyzes, and refines various programs to meet the insurance needs of society.

Approximately 11,500 actuaries are members of the two leading North American professional societies and the demand for qualified actuaries remains extraordinarily high.

Quality management and productivity encompasses a variety of techniques useful in improving manufacturing processes. Elements from statistics, operations research, forecasting, production management, and administrative science are combined to provide solutions to these problems. In recent years there has been an increased awareness of the value of producing quality products and there is a large demand for people who are prepared to aid in this effort.

Our department has an international reputation for excellence in teaching, research, and professional leadership. Our students have had marked success in finding employment, and our graduates can be found at all levels of the fields mentioned above.



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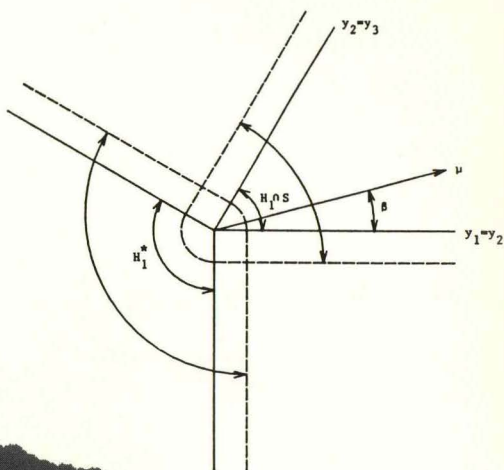
HE FOUR PROGRAMS

PH.D. IN STATISTICS

The Ph.D. program prepares students for careers in research and teaching at the highest level. A minimum of 72 semester hours of course work is required (including those taken in the M.S. program) including advanced work in statistical theory, statistical inference, linear models, and probability theory. Students must pass qualifying and comprehensive exams and write a thesis. The program takes about three years to complete after the M.S. has been earned.

M.S. IN STATISTICS

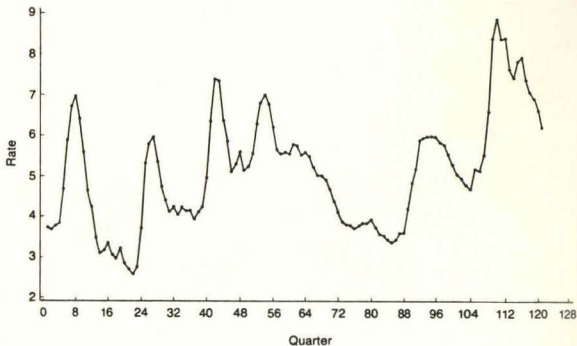
This program prepares students either for entrance into the Ph.D. program or for careers as applied statisticians. The course work includes both theory and applications courses with the student selecting the area of emphasis.



From Robertson, Wright, and Dykstra's book, *Order Restricted Statistical Inference*.

A DMISSIONS

The University requires that applicants for the M.S. degree program have a bachelor's degree with at least a 2.30 GPA and that applicants for the Ph.D. program have at least a 2.70 graduate GPA. The department's admissions standards are higher than this and particular emphasis is placed on the applicant's grades in mathematics and statistics courses. The Graduate Record Examination is also required. Applicants whose native language is not English must submit TOEFL scores. A score of at least 480 is required for admission. Newly admitted



From Cryer's book, *Time Series Analysis*.

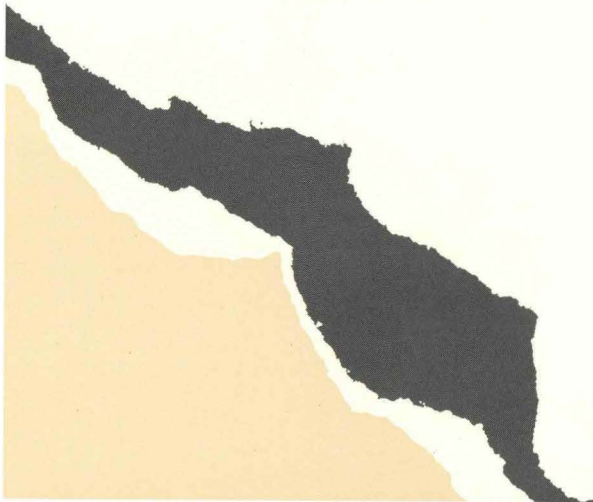


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UITION AND FINANCIAL ASSISTANCE

Residents of the state of Iowa and all students supported by the department on at least a quarter-time appointment are entitled to the resident tuition rate. The 1988-89 tuition rates for one semester (nine semester hours or more) are \$1,010 for a resident and \$2,860 for a nonresident.

Departmental support is in the form of teaching and research assistantships and paper-grading assignments. In addition, both the University (through the Teaching-Research and Iowa fellowships) and the department (through the Rietz and Craig scholarships) offer enhanced support to outstanding applicants. These enhancements can be cash grants, tuition support, summer support, and/or extended periods with no assigned duties.



Teaching assistants conduct discussion sections in conjunction with large-lecture elementary statistics courses. They also write and grade quizzes, proctor exams, and conduct office hours. Currently 24 of our students hold half-time assistantships and 8 hold quarter-time assistantships.

An additional 6 students hold research assistantships. These involve either assisting individual faculty members with their research or consulting with faculty members and students from other departments.

The 1988-89 academic year salary for a beginning half-time research or teaching assistant is \$9,200. In addition, there are a number of summer research assistantships. The final form of support is paper grading. At the present time 11 students are employed as quarter-time paper graders. These pay about \$900 per semester and entitle the recipient to the resident tuition rate.





FACILITIES

The department is housed in MacLean Hall, adjacent to the Old Capitol, a national historic landmark and the academic center of campus. MacLean Hall contains faculty and graduate student offices, classrooms, the Math Sciences Library, and computer facilities. The building also houses the Statistical Consulting Center, which serves the academic community and provides our students with important experience in data analysis and consulting.


OUR STUDENTS

For the 1987-88 academic year there were 102 students enrolled in our graduate programs. A few breakdowns are*

Actuaries (M.S. degree only):	59
Male	26
Female	33
Statisticians:	43
Male	31
Female	12
M.S.**	27
Ph.D.	16

*The quality management and productivity M.S. program began in the fall of 1987.

**Some of these students will continue for the Ph.D. degree. Only students who have earned the M.S. degree can be considered as Ph.D. students.



Degrees awarded	1984-1985	1985-1986	1986-1987
Actuarial Science or Statistics M.S.	23	15	17
Statistics Ph.D.	5	1	3

Names and current positions of recent Ph.D.'s

- C. Du Mond ('88) Statistician, Syntex Pharmaceutical,
- S. Hillis ('87) Assistant Professor, American University
- R. Kelly ('87) Assistant Professor, Penn State University
- G. Mendieta ('87) Assistant Professor, Wichita State University
- S. Amini ('86) Statistician, Deborah C.V. Research Institute
- S. Han ('85) Assistant Professor, Seoul City University
- P. Wollan ('85) Assistant Professor, Michigan Tech University
- G. Brill ('85) Assistant Professor, Luther College
- D. Patterson ('85) Assistant Professor, University of Montana
- L. Yuh ('85) Statistician, Merrill Dow

THE FACULTY

JOHN J. BIRCH

Professor Emeritus. Ph.D., University of California, Berkeley (1960). Major field: Stochastic processes.

JAMES D. BROFFITT

Professor. Ph.D., Colorado State University (1969). Associate, Society of Actuaries. Major fields: Actuarial science (life and health), multivariate statistics.

JAMES A. CALVIN

Assistant Professor. Ph.D., Colorado State University (1985). Major fields: Linear models, experimental design, applied statistics.

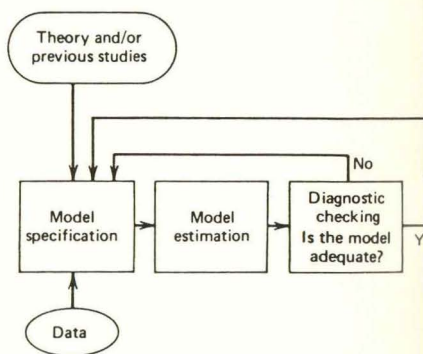
MARK L. CONAWAY

Assistant Professor. Ph.D., University of Minnesota (1985). Major fields: Categorical data analysis, applied statistics.

JONATHAN D. CRYER

Associate Professor. Ph.D., University of North Carolina-Chapel Hill (1966). Major fields: Time series analysis, mathematical statistics.

Model-Building Phase



From Abraham and Ledolter's book, *Statistical Methods for Forecasting*.

RICHARD L. DYKSTRA

Professor. Ph.D., The University of Iowa (1968). Fellow, American Statistical Association; Fellow, Institute of Mathematical Statistics. Major fields: Constrained optimization, order restricted inference, inequalities, mathematical statistics.

LEONARD S. FELDT

Professor. Ph.D., The University of Iowa (1954). Major fields: Experimental design, reliability of educational and psychological tests.

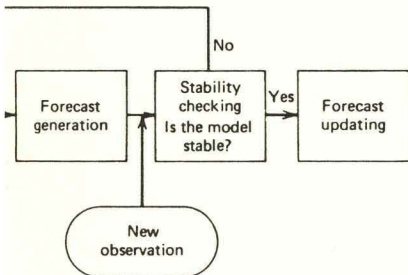
ROBERT V. HOGG

Professor. Ph.D., The University of Iowa (1950). Fellow, American Statistical Association; Fellow, Institute of Mathematical Statistics; Elected Member, International Statistical Institute; President of the American Statistical Association (1988). Major fields: Robust and adaptive estimation, nonparametric statistics.

LLOYD A. KNOWLER

Professor Emeritus. Ph.D., The University of Iowa (1937). Major fields: Actuarial science, biostatistics, quality control.

Forecasting Phase



JOHANNES LEDOLTER

Professor. Ph.D., University of Wisconsin-Madison (1975). Major fields: Time series analysis, statistical applications in business and engineering.

RUSSELL V. LENTH

Associate Professor. Ph.D., University of New Mexico (1975). Major fields: Robust methods, statistical computing, directional data, quality improvement.

MARIANTHI MARKATOU

Assistant Professor. Ph.D., Pennsylvania State University (1988). Major fields: Nonparametric statistics, robust inference.

TIM ROBERTSON

Professor. Ph.D., University of Missouri at Columbia (1966). Fellow, American Statistical Association; Fellow, Institute of Mathematical Statistics; Elected Member, International Statistical Institute. Major fields: Order restricted inference, mathematical statistics.

RALPH P. RUSSO

Associate Professor. Ph.D., SUNY at Binghamton (1980). Major field: Probability theory.

JAMES A. SCONING

Assistant Professor. Ph.D., Florida State University (1985). Major fields: Nonparametric statistics, reliability theory.

J. SEDRANSK

Professor and Chair. Ph.D., Harvard University (1964). Fellow, American Statistical Association; Elected Member, International Statistical Institute; Board of Directors, American Statistical Association (1985-88); Editor, *Journal of the American Statistical Association*. Major fields: Bayesian statistics, sampling theory.

GEORGE G. WOODWORTH

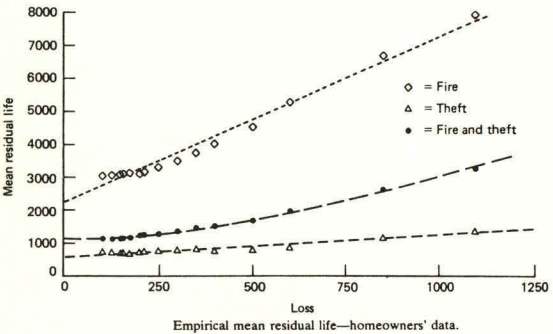
Associate Professor. Ph.D., University of Minnesota (1966). Major fields: Law and justice statistics, multivariate analysis, statistical computing, choice modeling.

ROBERT F. WOOLSON

Professor and Director of Biostatistics Division. Ph.D., University of North Carolina (1972). Major fields: Survival models, categorical data analysis.

DALE L. ZIMMERMAN

Assistant Professor. Ph.D., Iowa State University (1986). Major fields: Linear models, experimental design, spatial statistics.



From Hogg and Klugman's book, *Loss Distributions*.

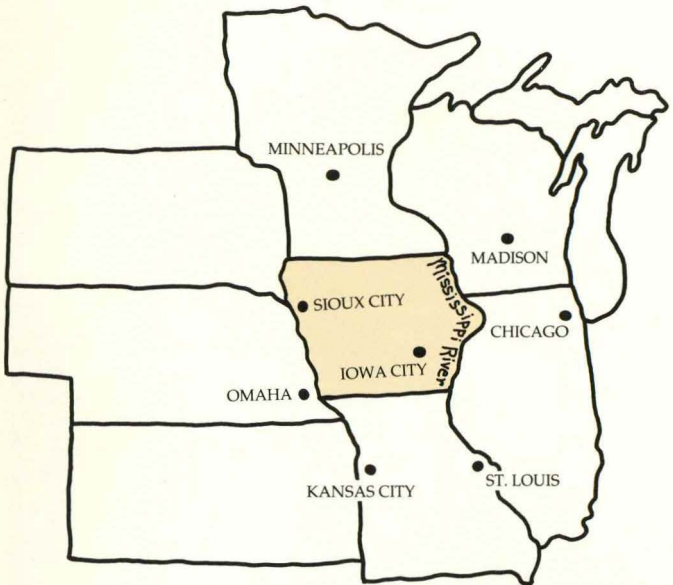


IOWA CITY

Iowa City is a community of 50,000 people located along the Iowa River in east-central Iowa, just south of Interstate 80. It is within 300 miles of Chicago, St. Louis, Kansas City, Omaha, and Minneapolis. The Cedar Rapids Municipal Airport is 20 miles to the north and two Amtrak stations are within 50 miles to the south and southeast. The city is also served by major bus lines.

Iowa City's attractive business district is adjacent to MacLean Hall. It comprises an open air pedestrian plaza, an enclosed shopping mall, and side streets containing numerous specialty shops. The area has over 100 restaurants, 12 movie theaters, 37 parks, 8 golf courses, 2 first rate public libraries, and an excellent public school system. Situated on over 400 acres located 15 miles north of town, the Macbride Nature Recreation Area offers camping, hiking, canoeing, sailing, and nature programs. The city maintains a recreation center and sponsors many activities for children.

The area is served by the student-run Cambus and by the Iowa City and Coralville transit systems. Cambus arrives every 15 minutes and is free while city buses arrive every 30 minutes. All parts of Iowa City and the suburb of Coralville are a short walk from one of these systems. The Cambus system also operates the Bionic Bus to serve the needs of handicapped students, faculty, and staff.






THE UNIVERSITY OF IOWA

The University of Iowa, founded in 1847, is situated on 900 acres along the banks of the Iowa River in Iowa City. More than 29,000 students are enrolled in ten colleges: Liberal Arts, Graduate, Business Administration, Law, Medicine, Dentistry, Nursing, Pharmacy, Education, and Engineering.

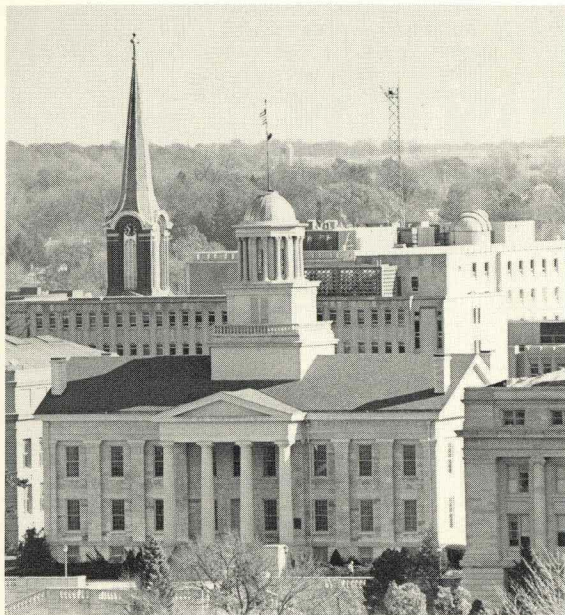
The University provides the area with professional caliber music, dance, and theater through the Iowa Center for the Arts. The ICA comprises Clapp Recital Hall, Mabee Theatre, and Hancher Auditorium, a modern structure overlooking the Iowa River that seats 2684.

The University of Iowa is home to the Iowa Hawkeyes, nationally recognized in all major college sports. The 65,000-seat Kinnick Stadium and the 15,000-seat Carver-Hawkeye Arena are host to a variety of intercollegiate athletic competitions. Recreation and intramural facilities and programs provide students with a tremendous variety of outlets for exercise and competition.

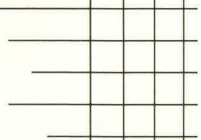


F OR MORE INFORMATION

The Office of Admissions may be called toll free at 800/272-6412 from within Iowa and at 800/553-6380 from Illinois, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin. From elsewhere call 319/335-3847. The Department of Statistics and Actuarial Science can be reached at 319/335-0694.



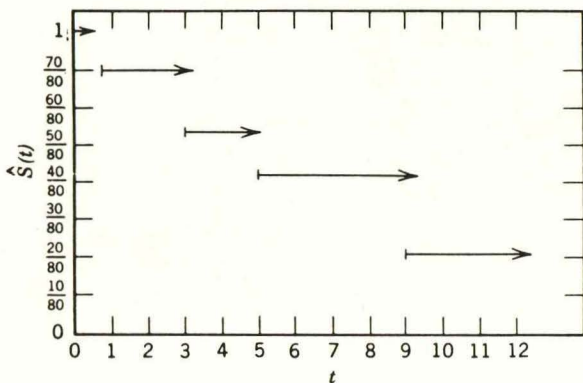
View of Old Capitol with MacLean Hall in the right foreground.





ELECTED FACULTY PUBLICATIONS

- Birch, J.** (1962). "Approximations for the entropy for functions of Markov chains," *Annals of Mathematical Statistics*, 33.
- Birch, J.** with G. Fethke (1982). "Rivalry and the timing of innovation," *Bell Journal of Economics*, 13.
- Birch, J.** with T. Robertson (1983). "A classroom note on the sample variance and the second moment," *American Mathematical Monthly*.
- Broffitt, J. D.** with J. S. Williams (1973). "Minimum variance estimators for misclassification probabilities in discriminant analysis," *Journal of Multivariate Analysis* 3, 311-27.
- Broffitt, J. D.** (1984). "Maximum likelihood alternatives to actuarial estimators of mortality rates," *Transactions of the Society of Actuaries* 36, 77-122.
- Broffitt, J. D.** (1984). "A Bayes estimator for ordered parameters and isotonic Bayesian graduation," *Scandinavian Actuarial Journal* 231-47.
- Calvin, J. A.** (1986). "A new class of variance balanced designs," *Journal of Statistical Planning and Inference* 14, 251-54.

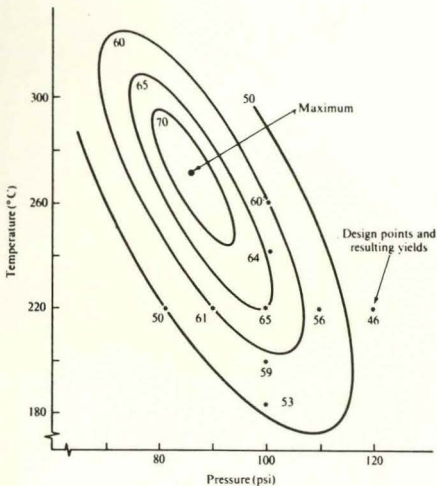


From Woolson's book, *Statistical Methods for the Analysis of Biomedical Data*.

- Calvin, J. A.** with S. Jeyaratnam and F. A. Graybill (1986). "Approximate confidence intervals for the three factor mixed model," *Communications in Statistics* B15.
- Calvin, J. A.**, with Kishore Sinha (to appear). "A method for constructing variance balanced designs," *Journal of Statistical Planning and Inference*.
- Conaway, M.** (to appear). "Conditional Likelihood Methods for Repeated Categorical Responses," *Journal of the American Statistical Association*.
- Cryer, J. D.** (1986). *Time series analysis*. Boston: Duxbury Press.
- Cryer, J.D.** with M. Kyte and J. Stoner (1988). "A time series analysis of public transit ridership in Portland, Oregon," to appear in *Transportation Research A* Vol. 22A.
- Cryer, J.D.** with John C. Nankervis and N. E. Savin (1989). "Mirror-image and invariant distributions in ARMA models," *Econometric Theory* Vol. 5. No. 1.
- Dykstra, R. L.** (1983). "An algorithm for restricted least squares regression," *Journal of the American Statistical Association* 78, 837-42.
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- Feldt, L. S.** with D. J. Woodruff (1986). "Tests for equality of several alpha coefficients when their sample estimates are dependent," *Psychometrika* 51, 393-413.

- Hogg, R. V.** (1974). "Adaptive robust procedures: A partial review and some suggestions for future applications and theory," *Journal of the American Statistical Association* 69, 909-27.
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- Hogg, R. V.** with E. A. Tanis (1983). *Probability and statistical inference*, second edition. New York: Macmillan.
- Ledolter, J.** with B. Abraham (1983). *Statistical methods for forecasting*. New York: John Wiley.
- Ledolter, J.** with R. V. Hogg (1987). *Engineering statistics*. New York: Macmillan.
- Ledolter, J.** with B. Abraham (1984). "A note on inverse autocorrelations," *Biometrika* 71, 609-14.
- Lenth, R. V.** (1981). "On finding the source of a signal," *Technometrics* 23, 149-54.
- Lenth, R. V.** with C. E. DuMond (1987). "A robust confidence interval for location," *Technometrics* 29, 211-20.
- Lenth, R. V.** (1987). "Consistency of deviance-based M estimators," *Journal of the Royal Statistical Society, Series B* 46, 326-30.
- Robertson, T.** with H. Mukerjee and F. T. Wright (1986). "A probability inequality for elliptically contoured densities with applications in order restricted inference," *Annals of Statistics* 14 (to appear).
- Robertson, T.** with R. L. Dykstra and F. T. Wright (Eds.) (1986). *Advances in order restricted statistical inference*. New York: Springer-Verlag.
- Robertson, T.** with H. Mukerjee and F. T. Wright (1987). "Comparison of several treatments with a control using multiple contrasts," *Journal of the American Statistical Association* 82, 902-10.
- Russo, R. P.** with D. L. Hanson (1983). "Some results on increments of the Wiener process with applications to lag sums of i.i.d. random variables," *Annals of Probability* 11, 609-23.
- Russo, R. P.** with D. L. Hanson (1985). "Some limit results for lag sums of independent, non-i.i.d., random variables," *Z. Wahrscheinlichkeitstheorie* 56, 425-45.
- Russo, R. P.** (1988). "Strong laws for quantiles corresponding to moving blocks of random variables," *Annals of Probability* 16, 162-71.

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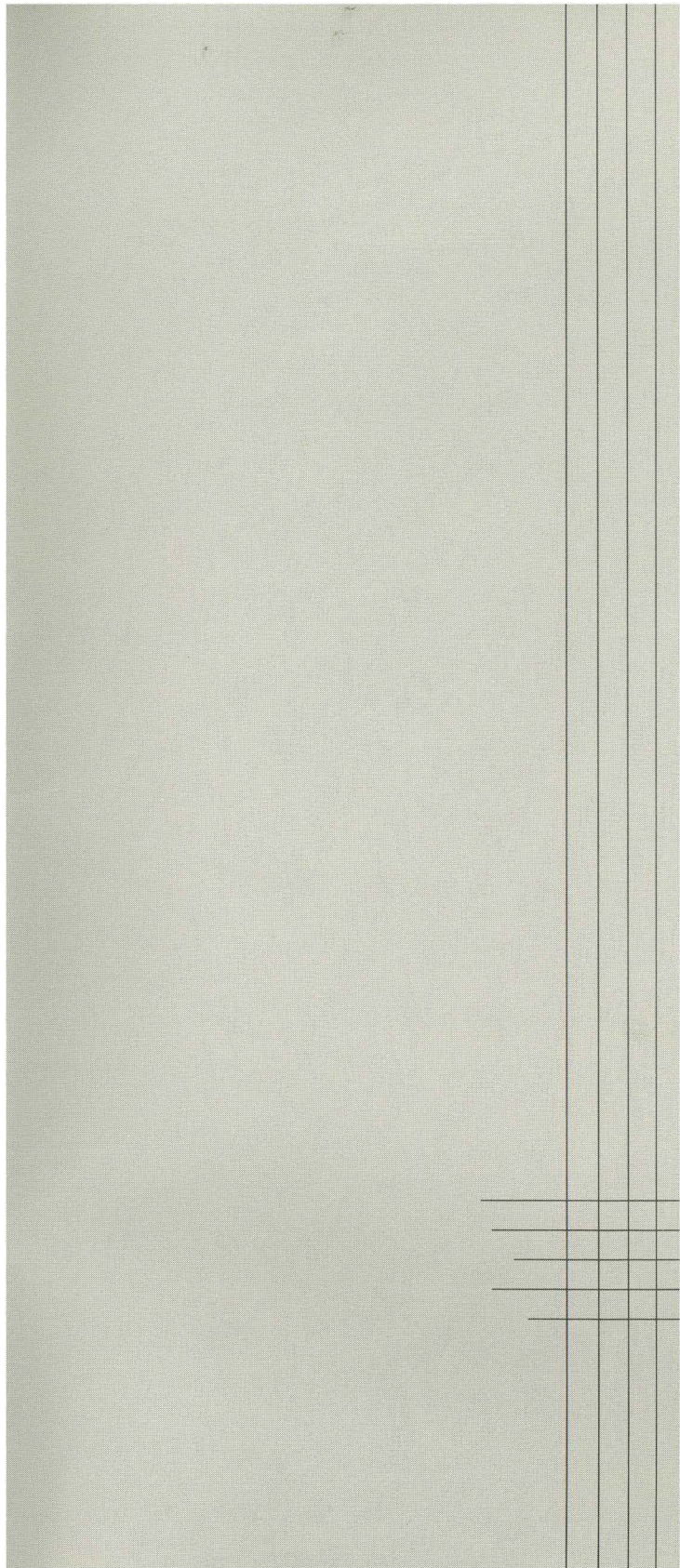
From Hogg and Ledolter's book,
Engineering Statistics.

- Woodworth, G. G.** with D. C. Baldus and C. A. Pulaski (1985). "Monitoring and evaluating contemporary death sentencing systems: Lessons from Georgia," *U. C. Davis Law Review* 18.
- Woolson, R. F.** (1985). "Sample size for case-control studies using Cochran's statistics," *Biometrics* 42.
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- Woolson, F. R.** (1987). *Statistical methods for the analysis of biomedical data* New York: John Wiley.

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