GRADUATE STUDIES

Department of Statistics
University of South Carolina
Columbia, South Carolina

LeConte College Building, Home of the Statistics Department

Graduate Brochure
Academic Year 2003–2004
Prepared By: Graduate Committee
The title of an article by Ogenstad and Hantzis in the October 2002 issue of *Applied Clinical Trials* had the title

‘Drowning in Information, But Thirsting for Knowledge.’

This phrase is so very true for society is saturated with information due partly to the fast paced advance in technology, but it is at the same time in search for real knowledge from these mountains of information. A statistician will have a significant role in this mining for knowledge in order for society to breath from this deluge of information.

Therefore, if you are planning to pursue graduate studies in the field of statistics, I congratulate you on an excellent choice. The science of Statistics is extremely important in the search for relevant knowledge since it aims, among its multitude of goals, to distill meaningful information from data which may be contaminated with errors and those inherently containing random components. Statistics has application in virtually any business or scientific endeavor, from quality improvement in industrial settings, to biological, medical, and environmental research, to improving the reliability of complicated engineering and electronic systems. If you have talents or have interests in applied work, mathematics, computers, or in dealing with people, the statistics profession offers you an avenue to fulfill such interests.

Employment opportunities for statisticians are still excellent, despite economic slowdowns which have led to layoffs in other areas. Almost all of our graduates this past year have jobs awaiting them even before graduation! Indeed, at least 96% of our Masters (44) and all our PhD (11) graduates seeking employment in the past six years, have found a job in the field within six months of graduation. Ten of the PhD recipients elected to pursue academic careers; all have found tenure-track positions within two years, many at flagship state Universities (Indiana, Miami (Fla), New Hampshire, Texas Tech, University of South Carolina - Columbia). Non-academic employers at all levels include Abbott Laboratories, Battelle Research Labs, Blue Cross/Blue Shield,
Hughes Aerospace, Michelin Tire, A.C. Nielsen, Smith-Kline Beecham, the U.S. Census Bureau, Westinghouse, and Fred Hutchinson Cancer Center.

We are very proud of the graduate experience we provide, and the academic training we provide our graduate students, which is a blend of theory and applications. Our department, formed in 1985, is large enough to offer a broad array of course selections. We have an energetic and internationally respected faculty. Yet, we are not so large that students could get lost in a crowd. Your graduate experience here can be one of the best times of your life; the friends you make here, including faculty, will be some of the best friends you’ll have in your life.

This brochure contains information regarding our programs, the University, and Columbia. If you have access to the Internet, more information is colorfully supplied on our homepage. I, or Professor Don Edwards, the current Assistant Graduate Director, would be happy to discuss our programs with you, by phone, e-mail, or in person.

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The Department

The department’s Center for Reliability and Quality Science focuses on applications of statistics in industry. The staff of the Statistical Laboratory provides expert statistical advice to researchers across the campus, to government agencies, and to industry. The Statistics Club and the local chapter of Mu Sigma Rho (the national honor society for Statistics) allow for social and professional interaction among students, faculty, and prospective employers.

Students find the department an enjoyable and stimulating place to pursue graduate studies. There are 14.5 regular and 7 adjunct faculty members, and approximately 33 fulltime graduate students and about 28 part-time students in the department. Students come to the University from a variety of backgrounds, from across the country and around the world (75% of our graduate students are U.S. citizens or Permanent Residents; 30% are female; 3% represent racial or ethnic minorities).

The Department of Statistics is located in the heart of the University’s beautifully landscaped lawns and only steps away from the historic Horseshoe.

Graduate Programs

The department offers programs of study leading to the CAS (Certificate of graduate study in Applied Statistics), MIS (Master of Industrial Statistics), MS (Master of Science), and PhD (Doctor of Philosophy) degrees in Statistics. All programs emphasize broad training in both applied and theoretical statistics.

A new partnership between the University of South Carolina and the Center for Quality at Midlands Technical College allows MIS and CAS students to earn credits towards the Six Sigma Certificate Program while earning their MIS and CAS credits. Designated courses in the MIS and CAS programs earn dual credit in both the MIS and CAS program and the Six Sigma Certificate Program.

The CAS program is a graduate level “minor” in statistical methods. It is designed to provide engineers and scientists with the modern data analytic tools needed for effective practice as a specialist in statistical methods. The CAS requires 18 semester hours of approved graduate credits in statistics.

The Master of Industrial Statistics (MIS) degree is geared toward persons who are currently working in a business, government, or industrial setting. While some theory is introduced, the focus is on applications of statistics and how statistics can be used to improve quality in an organization or process. The entering MIS student will have two years’ work experience.

The MS degree is designed to provide students with the necessary background for employment as a professional statistician in business, industry, or government. It also builds a solid foundation for students interested in a PhD in Statistics or a related field. Considerable flexibility in program emphasis is possible through the selection of elective courses and the thesis topic.

The PhD degree is designed to prepare the candidate to teach statistics at the college or university level, to do independent research, and/or work as a lead statistician in business and industry. It emphasizes training in both theoretical and applied statistics, and develops students into independent researchers through their dissertation research.

The Faculty and Staff

Faculty in the Department of Statistics are committed to excellence in teaching and research. Most of the faculty are active in research. They are also recognized as being among the University’s best teachers and researchers, with Professor John Spurrier a recipient of the University’s most prestigious award, the Amoco Foundation Outstanding Teaching Award, and was recently awarded the Governor’s Teaching Award. Several of the faculty have been recognized nationally and internationally, with four among the regular faculty Elected Fellows of the American Statistical Association. Several of the faculty are members of Editorial Boards of several professional journals.

Regular and Emeritus Faculty

- **Georgiana R. Baker**, MS 1996, University of South Carolina; MBA 1985, St. John’s University. Instructor. Quality control and process improvement.
• Tammiee S. Dickenson, M.S. 1996, University of South Carolina. Instructor. Statistical Education; Educational Research and Measurement.
• Don Edwards, PhD, 1981, Ohio State University, Professor. Multiple Comparisons, Environmetrics, Response Surface Methodology.
• Nancy Glenn, PhD, 2002, Rice University, Assistant Professor. Bootstrap Methods; Density Estimation; Empirical Likelihood; Mathematical Optimization; Nonparametric Statistics.
• John M. Grego, PhD, 1989, Pennsylvania State University, Associate Professor. Robust Parametric Design, Semiparametric Mixture Models, Statistical Consulting.
• Brian T. Habing, PhD, 1998, University of Illinois at Urbana-Champaign, Assistant Professor. Psychometrics, Item Response Theory and Educational Measurement.
• Stanley K. Haines, Sr., M.S. 1991, Georgia Institute of Technology, Instructor. Statistical Education; Modeling and Simulation; Decision Support Systems.
• James D. Lynch, PhD, 1974, Florida State University, Professor. Reliability, Life Testing, Probability, Stochastic Processes, Mixture Models.
• Kerrie Nelson, PhD, 2002, University of Washington, Assistant Professor. Biostatistics; Generalized Linear Models; Analysis of Correlated Data.
• William J. Padgett, PhD, 1971, Virginia Polytechnic Institute & State University, Distinguished Professor Emeritus. Reliability, Life Testing, Survival Analysis, Nonparametric Estimation, Bayesian Estimation, Statistical Quality Control.
• Walter W. Piegorsch, PhD, 1984, Cornell University, Professor. Environmetrics, Generalized Linear Models, Simultaneous Inferences.
• John D. Spurrier, PhD, 1974, University of Missouri, Professor. Nonparametrics, Multiple Comparisons, Statistical Education.
• Peter Waddell, PhD, 1996, Massey University, New Zealand, Associate Professor. Bioinformatics, Gene expression data analysis, Statistical methods for phylogenetic analysis.
• R. Webster West, PhD, 1994, Rice University, Assistant Professor. Stochastic Modeling, Risk Assessment, Statistical Computing, Change-Point Analysis.

Adjunct Faculty
• J. Wanzer Drane, PhD, 1967, Emory University, Professor. Dose-Response Theory, Geographic Information Systems, Imputation and Nonresponse.
• James Hardin, PhD, 1992, Texas A&M University, Research Associate Professor. Estimating equations, statistical computing.
• Huynh Huynh, PhD, 1969, University of Iowa, Professor. Psychometrics, Large-scale Educational Assessment Programs; Repeated Measures Designs.
• Andrew Lawson, PhD, 1990, University of St. Andrews. Spatial and Environmental Epidemiology; Directional Statistics; Environmental Science and Geoscience.
• Elizabeth Slate, PhD, 1991, Carnegie-Mellon University, Adjunct Associate Professor at USC and Associate Professor at Medical University of South Carolina, Charleston. Bayesian methods, biostatistics, longitudinal data analysis, statistical computing.
• Cary Tuckfield, PhD, 1985, Indiana University, Section Leader of Statistical Consulting at Savannah River Technology Center. Applied statistics, environmetrics.
• Machelle Wilson, PhD, 1992, University of California, Davis, Researcher, University of Georgia, Savannah River Ecology Laboratory. Environmental statistics.

Staff
• Debra Williams, Business Manager.
• Anita Wood, Student Services Program Coordinator I and Undergraduate and Graduate Secretary.
• Minna Moore, Information Technology Manager.

Applying for Admission
To be considered for the graduate program, applicants should have a bachelor’s degree and an appropriate training in mathematics which should include at least three semesters of calculus (for MS or PhD), a course in advanced calculus or introductory analysis, and a course in matrix algebra. Prior training in statistics is not required but is highly recommended. Application should be made online via the internet. Go to http://www.gradschool.sc.edu/ and click on the link pertaining to “Future Students” and then the link “Admissions Application.” Paper applications are still possible and an application packet may be requested through the Graduate School, though online applications are preferred for efficiency purposes. Applicants should submit an official transcript from each college previously attended, at least two letters of recommendation, and a report of scores achieved on the Graduate Record Examination (GRE). The Graduate Management Admission Test (GMAT) is acceptable for the CAS and MIS programs.
Generally, a grade point average of at least 3.20 with high grades in mathematics and statistics and a total verbal and quantitative GRE score of at least 1050 are expected for admission at the Master’s level, and generally a higher score is needed for the PhD degree. International applicants are also required to submit a report of scores on the Test of English as a Foreign Language (TOEFL) examination. A minimum of 570 (with a first-test subscore above 57) [for the computerized version, an overall score of at least 230 with at least a score of 25 on the first subtest] is required to be considered for admission. An application fee of $40 is also required.

A group picture of some of the incoming graduate students for Fall 2003 taken in front of LeConte College Building.

Financial Assistance

The primary source of financial aid is the graduate assistantship. Graduate assistants gain valuable work experience by teaching statistics, working in the consulting laboratory, or assisting faculty with research projects. Half-time teaching assistantships typically require 20 hours of commitment per week and carry an academic-year stipend of at least $12,200. The Department has also in the recent past been able to support all graduate assistants in the summer. Current summer stipends exceed $2,200 for a five-week term. Students interested in being considered for an assistantship for the fall semester are encouraged to have their applications completed by January 15; the “hard” deadline is February 15. International students must have TOEFL scores of at least 600 (with a first-test subscore of at least 60) [or a score of at least 250 in the computerized version with a first sub-test score of at least 30] to be considered for assistantships. U.S. citizens or permanent residents applying for the PhD program are considered for Graduate School Fellowships of up to $8,000 per year in addition to the assistantships, as well as for other fellowships from the College of Science and Mathematics and the Department itself. Currently, of the 33 supported students this Fall Semester 2003, nine have additional fellowship awards that augment their assistantship support.

Expenses

Aside from the stipends provided by the graduate assistantship award, graduate assistants are also provided tuition supplements to partially cover their tuition. Currently, for at least 12 hours of credit during a semester the tuition is $3,105, while if the number of credit hours is less than 12, tuition is computed at $308 per credit hour. The tuition supplement for a semester provided for students enrolling in at least 9 units is $1,750 this year, and the student covers the difference between the total tuition and the tuition supplement. Tuition payments can be paid via payroll deduction on a biweekly basis. In-state, full-time (6-9 hours) graduate students not under support currently pay $308 per credit hour.

Office Space

Students who attend the University on assistantships are provided office space in LeConte College, which also houses the department office, computer facilities, and most classrooms. Each graduate assistant is provided a computer (either Unix-based or a PC) which are connected to the College and University computing networks.

Housing

Low-cost, convenient University housing is available. Since some facilities have fairly long waiting lists and are assigned on a first-come, first-served basis, prospective graduate students should register with the Office of Housing and Residential Services as soon as possible after being accepted into the graduate program, 803-777-4283. In addition to University housing, Columbia has a number of apartments. Typically, a two-bedroom, air-conditioned apartment rents for $450 to $600 per month.

Certificate of Graduate Study in Applied Statistics

The 18-hour (six course) CAS program requires a core of STAT 704, 705, and 706 (or 506), or the equivalent - please see the course descriptions below. The remaining 9 hours are electives. Up to six hours of approved statistics courses may be taken outside the Department, but at least nine of the 18 hours must have the STAT designator at the 700-level or above. Courses taken in the CAS program may be applied with permission towards other graduate degrees. Pending notification of the SC CHE, it will be possible to complete the entire CAS program though distance learning in South Carolina.
Master of Industrial Statistics

The MIS degree requires a core of seven courses: STAT 525, 702, 703, 704, 705, 506 or 706, and 750 or 761. Additionally, two hours of STAT 798 (independent study) is required. Students without consulting experience are highly encouraged to take Stat 790 (Introduction to Statistical Consulting). The independent study course will ideally be a study of an appropriate application of statistics to the student’s work experience. The remaining 12 semester hours are electives. It is possible to complete the entire MIS degree through distance learning in South Carolina.

Master of Science in Statistics

The MS degree requires at least 30 hours of approved course work including a core of STAT 704, 705, 712, 713, and 714 and three semester hours of thesis preparation (STAT 799). In addition to these 30 hours, one semester hour each of the consulting seminar (STAT 790) and practicum (STAT 791) and two semester hours of Statistics Seminar (STAT 795) are required. Typically, the M.S. requires two full years (four major semesters) of study. At least 21 semester hours of the MS program, excluding thesis credits, must be earned in courses numbered 700 and above.

Candidates for the MS are required to complete a thesis. The thesis is a guided introduction to statistical research and develops the scientific and technical communications skills that a professional statistician needs and offers the students the opportunity to work closely with a faculty member on an extended project.

Doctor of Philosophy in Statistics

The PhD requires at least 48 semester hours of regular coursework, including the core courses STAT 704, 705, 710, 711, 712, 713, 714, 715, 721, 722, 724 and 740. In addition to this regular coursework, one semester hour each of the consulting seminar (STAT 790), practicum (STAT 791), 6 semester hours of Statistics Seminar (STAT 795), and the three-semester-hour doctoral seminar (STAT 890) are required.

The doctoral dissertation is to be written in conjunction with the dissertation research course (STAT 899), for which at least 12 semester hours must be earned beyond the 48 hours of regular course work. The content of the dissertation is expected to make a significant contribution to the statistical literature and to be publishable in a reputable journal. No foreign language is required for the PhD degree (or any other graduate degree in Statistics at USC).

Students pursuing the PhD in statistics are required to pass three examinations. The first, the Admission to Candidacy Examination, taken after one year of study, is designed to measure potential for advanced study in statistics at the doctoral level. The second, the Comprehensive Examination, is taken after all course work is completed. The third and final, the Dissertation Examination, is a defense of the dissertation results.

Selected Graduate Courses

- STAT 506 Intro to Experimental Design
- STAT 510 Intro to Applied Probability
- STAT 517 Computing in Statistics
- STAT 518 Nonparametric Stat. Methods
- STAT 519 Sampling
- STAT 520 Forecasting and Time Series
- STAT 525 Statistical Quality Control
- STAT 530 Exploring Multivariate Data
- STAT 590 Statistics Capstone
- STAT 702 Intro to Stat. Theory I
- STAT 703 Intro to Stat. Theory II

Professor Walt Piegorsch explaining to a student some interesting statistics stuff!

Professor Joe Padgett with his former doctoral students.
Colloquia and Research Seminars

The Department conducts a regular colloquium series featuring visiting scholars and university faculty to share their research activities. Different subgroups of the department’s faculty, together with the advanced graduate students, also conduct regular research seminars on a variety of research topics of current interests. All graduate students are encouraged to participate in these colloquia and research seminars to enhance their exposure to research. Last May 2003 the Department organized the International Conference on Reliability and Survival Analysis which was held at the University and which attracted numerous international researchers.

Computing Facilities

The department places strong emphasis on developing the computational skills of its students and is well supported with the equipment and software necessary for instruction and research. The Mathematics and Statistics Computation Center houses a cluster of Sun workstations providing access to S-Plus, R, Maple, Matlab, Linpack, TeX, and \LaTeX. In addition, the Statistics Alumni Computing Facility and graduate office suites offer multiple personal computers with 24-hour access for graduate students. These provide access to SAS, Minitab, S-Plus, R, \TeX, \LaTeX, and a variety of word processors and database softwares.

Center for Reliability and Quality Sciences

The department’s Center for Reliability and Quality Science is actively involved in helping industry and government improve the reliability and quality of products and services. Using the talents of the faculty and graduate students and the experience of an industrial advisory committee, the center researches reliability and quality issues, provides training courses on quality improvement and experimental design for industrial personnel, and designs and implements quality improvement experiments in clients’ production facilities.

Statistical Laboratory

Statistical consulting is provided within the department by the Statistical Laboratory, directed by a faculty member. The laboratory provides service to University and non-University personnel. In particular, assistance is given to faculty and graduate students of the University in the statistical aspects of their research. These services
cover a wide range, from simple application of standard statistical methods and computer packages, to derivation of theory to handle more complex problems. The laboratory employs graduate students as assistants to the director and managers. This employment provides extremely valuable experience and benefits students financially.

The University

The University of South Carolina is the state’s flagship and largest university and Columbia is the nucleus of eight statewide campuses. About 25,000 students are enrolled at Columbia campus and about 37,000 in all the campuses. About 29% of the students in the Columbia campus are graduate students. There are approximately 1,900 full-time faculty members in all of the campuses, with about 1,000 in the Columbia campus with 925 of them on tenured/tenure-track positions. The University attracts students from every state in the nation and more than 100 foreign countries. Without question, USC is one of the most progressive and intellectually exciting institutions in the Southeast. The Columbia campus offers 71 programs of study leading to the bachelor’s degree. Master’s degrees are offered in about 145 disciplines (5 professional); 59 programs leading to the PhD degree, and 12 professional doctorates including law, medicine, pharmacy, and public health. With nearly 10,000 students currently enrolled in post-baccalaureate work, the University is one of the largest (top 20) postgraduate institutions in the nation in terms of size. About 1,600 master’s and about 250 PhD degrees are awarded annually. As a member of the Southeastern Conference (SEC), the University features a wide range of nationally recognized intercollegiate athletic programs in both men’s and women’s sports.

The City of Columbia

Columbia, with a metropolitan population of more than 670,000 combines the advantages of a progressive, growing area with the pace of a smaller city. Residents enjoy temperate seasons with mild winters. In the spring, dogwood and azalea create a profusion of color. At the geographic center of South Carolina, Columbia is the seat of state government as well as headquarters for numerous state and regional businesses.

The metropolitan area is also home to several institutions of higher education, and some of South Carolina’s most outstanding public schools. Located at the intersection of three interstate highways, Columbia is midway between Miami and New York. Columbia Metropolitan Airport is served by six airlines; Amtrak, Greyhound, and Trailways provide additional passenger service.

The Columbia area offers a variety of recreational opportunities for the outdoor enthusiast. With several large lakes nearby, plus the Congaree and Saluda rivers, boating and other water sports are year-round pastimes. You can reach either ocean beaches or mountain vistas in two to three hours. As a cultural center in South Carolina, the city is home to a philharmonic orchestra, a symphony, ballet and dance companies, theatres, and galleries. The Columbia Museum of Art contains an important part of the Kress Collection of Renaissance art. The State Museum, one of the largest in the South, features art, history, science and technology displays, and special visiting exhibits.

The city boasts a thriving nightlife and throughout the year, numerous outdoor festivals and concerts provide additional leisure activity. One of Columbia’s most popular attractions is Riverbanks Zoo and Botanical Gardens. Home to more than 2,000 animals, it is one of the finest small zoos in the world.

Equal Opportunity and Affirmative Action

The University of South Carolina provides equal opportunity and affirmative action in education and employment of all qualified persons regardless of race, color, religion, sex, national origin, age, disability, or veteran status.

98315 University Publications 9/98
Graduate Faculty Research, Interests, and Selected Publications

• **Don Edwards**, Ph.D., Professor, Fellow of the ASA

  **Website**: http://www.stat.sc.edu/~edwards/

  **Areas of Research**: Environmetrics, Multiple Comparisons, Response Surface Methodology, Statistical Education.

  **Brief Description of Major Research Activities**: I have interests in a broad range of topics in applied statistics, but most of my recent funded research activity is in the analysis of environmetric data. For example, I have recently participated in a three-year project, funded by NOAA, to analyze data on water quality from the National Estuarine Research Reserve System (NERRS), a system of 26 sites in the U.S. and Puerto Rico. From an ecological standpoint, the primary interest was in determining the factors leading to hypoxia (dangerously low dissolved oxygen) in marsh and riverine systems. From the statistical standpoint, a major challenge was to quantify and disentangle the cyclical oscillations due to tides, the 24-hour solar energy cycle, and the 365.24-day annual cycle, in very large data sets, in order to isolate “events” (non-cyclical perturbations, e.g., storms) in the data. This project fully funded at least one graduate student for three years, and some of my own time as well.

  I also have a regular thread, over 20+ years, of original research in the theory and methods of multiple comparisons / simultaneous inference, and this interest is ongoing. It has been supported in the past by the National Institutes of Health.

  **Why I Like Being a Statistician**: In a word, the variety. I’ve had the good fortune to work collaboratively with scientists in virtually every University of South Carolina department in the physical sciences, engineering, public health, and business schools, for example. In other words, I’ve never really had to decide “what I’m going to do when I grow up”.

  **Six Selected Publications**:


• **Nancy Glenn**, Ph.D., Assistant Professor

  **Website**: http://www.stat.sc.edu/~glen

  **Major Research Areas**: My major research areas are Nonparametric Statistics, Computer Engineering, and Mathematical Optimization.

  **Research Activities**: My research activities related to nonparametric statistics include Robust Empirical Likelihood, Bootstrap Methods, and Density Estimation. Research activities related to Computer Engineering includes Steganalysis and Random Graphs.

  **Why I Like Being a Statistician**: I like being a statistician because it allows me to be on the cutting edge of many different fields. Practically every field uses statistics, so I can be a jack of all trades and a master of all.

• **John M. Grego**, Ph.D., Associate Professor

  **Website**: http://www.stat.sc.edu/~grego/

  **Major Research Areas**: Design of Industrial Experiments, Semiparametric Mixture Models, Environmental Applications

  **Brief Description of Major Research Activities**: I initially worked on mixture models for attitudinal surveys and aptitude tests; mixture models assume that subjects come from more than one population and the population of origin is unknown. I have recently had the opportunity to apply mixture concepts to an environmental application with interesting policy applications-determining the magnitude of a 100-year flood for a watershed when floods can be caused by different types of meteorological events.

  In developing an industrial design of experiments short course with Prof. Lynch and Prof. Edwards, I became interested in simultaneous modeling of process mean and variance. In addition to research in this area, I have also been studying feedback control. Statistical modelling of a continuous production process can be used to make adjustments to the process more efficient. In my capacity as a statistical consultant, I am currently applying this work to local industry.
**Personal Statement about Profession:** Statisticians have a unique opportunity to be a resource for the community, running the gamut from assisting on scientific issues within the university, helping local industry, or providing expertise on environmental issues.

**Six Selected Publications:**


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**Selected Publications:**


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**Areas of Research:** Psychometrics - Item Response Theory and Educational Measurement

**Brief Description of Major Research Activities:** Psychometrics is the application of statistical methods and theory to educational and psychological measurement. (Psychometry on the other hand is the ability to tell the history of an object just by touching it... a much more lucrative ability that I have, unfortunately, yet to master.) While psychometricians use a variety of multivariate methods (and I am interested in most of them) my particular area of expertise is item response theory (IRT) and its application to large-scale educational tests. My research has focused on statistically examining how many different abilities such tests measure and how well they are measured. I have also conducted research on the related questions of bias in standardized tests and the dimensionality of more general psychological instruments. Research in IRT allows for the application of virtually every area of statistical theory, and mine has ranged from clustering algorithms to nonparametric regression to theoretical probability.

**Why I Like Being a Psychometrician:** I was first attracted to statistics, and psychometrics in particular, because of the opportunity to apply my theoretical mathematics training to actual sets of numbers. (If you’ve taken lots of advanced math courses you’ll know what I mean!) One of the great benefits of doing research in this area is that much of the research is of immediate interest to those who produce the major educational and psychological exams. You thus have the potential for your work to quickly play a part in something that eventually touches the lives of almost everyone in the country. That psychometricians (whether from statistics, psychology, or educational psychology backgrounds) are often eager and friendly collaborators is an added bonus.

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**Areas of Research:** Probability, Applied Probability, Stochastic Processes, Reliability, Industrial Problems. Currently have interests in complex systems, reliability and industrial problems.

**Personal Statement about my Profession:** I suckered someone into paying me for doing my hobby. (Being an administrator is not my hobby so I haven’t enjoyed what I have been doing lately.)

**Five Selected Papers:**

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**Website:** [http://www.stat.sc.edu/~lynch/](http://www.stat.sc.edu/~lynch/)


- J. D Lynch and J. Sethuraman (1999). On the ergodicity of General State Markov Chains, Unpublished. (Relates L1-convergence of a reverse martingale to the closability of the chain distribution to its equilibrium distribution.)


- Thompson, M.L. and Nelson, K.P. Linear regression with Type I interval and left-censored response data. Accepted by Environmental and Ecological Statistics (October 2001).


**Kerrie Nelson**, PhD, Assistant Professor

**Website:** http://www.stat.sc.edu/~nelson/

**Major research areas:** Analysis of correlated data, biostatistics, environmental statistics

**Brief Description of Major Research Activities:** While generalized linear mixed models have become a common form of statistical modelling in many situations involving correlated or longitudinal data, methods currently available are either very computer intensive or often inconsistent. One such method is an iterative bias correction method developed originally in 1995 by Kuk, which takes biased starting estimates of the regression coefficients and variance components and iteratively corrects the bias to result in consistent estimates. I have improved the method to make it computationally faster.

In addition, little has been done to date to investigate the performance of the various fitting procedures used in estimating the regression coefficients and variance components, including exact and approximate maximum likelihood and iterative bias correction methods. In my recently acquired PhD I compared the properties of these methods with regard to the effects of sample size and variability present in a model for auto-correlated count data. Current work is examining the behavior of the methods for commonly seen binary data models.

I have also examined the modelling of left- and doubly-censored data in an environmental setting, based on the exposure of children to a pesticide.

**Personal Statement:** I enjoy working in statistics mainly because of its usefulness in a wide range of fields of research and day-to-day situations. New statistical issues arise in many different settings, providing the opportunity to find solutions to both theoretical and applied questions.

**Selected Papers:**

- Thompson, M.L. and Nelson, K.P. Linear regression with Type I interval and left-censored response data. Accepted by Environmental and Ecological Statistics (October 2001).


**William J. Padgett**, Ph.D., Carolina Professor Emeritus, Fellow of the ASA and IMS, and Elected Member of the ISI

**Website:** http://www.stat.sc.edu/~padgett/

**Major Research Areas:** Reliability models and inference, censored/incomplete data problems, statistical quality control, nonparametric function estimation.

**Brief Description of Major Research Activities:** Current research projects involve development of models and inference for reliability of complex systems, such as fibrous composite materials, under accelerated test conditions (i.e. with a covariate in the model). Models are developed based on cumulative damage and first passage concepts, when damage to the system accumulates until a critical threshold is reached causing system failure. Generalized "accelerated test" models of the Birnbaum-Saunders-type or inverse Gaussian-type result from this approach, and fit actual failure data quite well. For the case that damage accumulation, or degradation, can be described by a Gaussian process whose positive drift parameter (and/or threshold value) depends upon the acceleration variable, a general family of failure
time distributions that are inverse Gaussian-type accelerated test models can be obtained. This allows inference about the failure time distribution at various acceleration levels based on either observed failures or observed degradation levels at the end of the test, or both kinds of observations, taken under two or more values of the acceleration variable. These models have application to prediction of failure and decisions on replacement of key equipment or components used in critical operations. Other "degradation models" to generalize and improve these Gaussian process models are also under consideration. A research-level book on parametric and nonparametric inference from record-breaking data has just been completed, coauthored with Dr. Sneh Gulati, a former doctoral student. The book is scheduled to appear in spring 2003.

Why I Like Being a Statistician: As an undergraduate major in mathematics with an emphasis on computing, I took a course on "engineering statistics" as well as courses in probability and mathematical statistics. These courses showed the applications of mathematical ideas and computational problems in practical settings. I desired to teach in the mathematical sciences at the college level, so my main interest in graduate studies gravitated to statistics. Since statistics is the basis of scientific investigation, and its applications in virtually every area of the sciences, business, engineering, and health/medical studies, I get to work on many important problems in different areas. Thus, being a statistician in a university setting is certainly interesting due to opportunities for diverse research activities, as well as teaching and curriculum development in a dynamic field.

Six Selected Publications:


- Edsel A. Peña, Ph.D., Professor and Graduate Director, Fellow of the ASA

Website: http://www.stat.sc.edu/~pena/

Areas of Research: Reliability; Survival Analysis; Non- and Semi-parametric Inference; Mathematical Statistics; Applied Stochastic Processes and Probability.

Brief Description of Major Research Activities: One of my current research pertains to the stochastic modeling and the development of statistical methods appropriate for recurrent events arising in public health and biomedical areas, reliability and engineering settings, and in many other areas such as economics, finance, sociology and political science.

Jointly with Prof. M. Hollander (Florida State Univ.), we have developed a very general model for recurrent events, and jointly with co-workers are in the process of developing appropriate statistical methods for analyzing such data under this general model. Currently, jointly with Prof. E. Slate (Medical Univ. of South Carolina), we are developing stochastic models for relating marker or surrogate processes to the occurrence times of recurrent events.

I am also interested in goodness-of-fit problems and residual analysis particularly those with incomplete data. This research also leads to the important issues of the impact of estimating nuisance parameters when developing estimation and testing procedures, and touches on the important issues of inference after model selection. I have been recently involved with the problem of inference after model selection, and through a recent manuscript, joint with Prof. V. Dukic (Univ. of Chicago), have examined different strategies for making inference after model selection. My research has been and is currently supported by grants from the National Science Foundation and the National Institutes of Health.

Why I Like Being a Statistician: Being an academic statistician is an ideal job for me because it allows me to do mathematical research, which I enjoy immensely, through the development of new statistical methods which have potential applicability in many areas such as in biomedical and public health research and in the engineering and reliability settings. Probabilistic and statistical research also suits my temperament because it is certainly non-trivial mathematically and so it challenges and forces me to exercise my mental capabilities and creativity to the utmost. There is also an inherent philosophical
nature to the subject of probability ("the only certain thing in this universe is that everything is uncertain"), and it still amazes me that one is able to make very accurate inferences about unknown parameters through the use of sample data that is quite minuscule relative to the population of interest, through the exploitation of "order emanating out of the chaos of randomness!"

Six Selected Publications:


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**Walter W. Piegorsch**, Ph.D., Professor, Fellow of the ASA, Elected Member of ISI

Website: [http://www.stat.sc.edu/~piegorsc/](http://www.stat.sc.edu/~piegorsc/)

**Major Research Areas**: Environmetrics, Generalized Linear Models, Simultaneous Inferences, Quantitative Risk Assessment

**Brief Description of Major Research Activities**: My research focuses on modeling and analysis for experiments in environmental biology. Recently, I studied statistical models for data from transgenic bio-technologies and considered guidelines for the design of future toxicity assays in transgenic animal systems. I also am part of a research team developing statistical and computational methods for estimating low-dose risks of environmental toxins for use in quantitative risk assessment, supported by funding from the U.S. National Cancer Institute. My other areas of research interest include simultaneous inferences for regression analyses, including generalized linear models, data mining of large environmental mutagenesis datasets, and the historical development of statistical thought as prompted by problems in the biological and environmental sciences

**Personal Statement about Profession**: I enjoy the opportunity to interact with other researchers on problems of scientific import, and to apply quantitative methods to these problems. I especially appreciate the chance to communicate our research results via printed and spoken word; clear, unambiguous communication of complex, yet important research results is a hallmark of an effective statistician. This latter issue is critical in how we train students for careers in statistics, and I am proud that it is a critical focus of the program here at USC.

Six Selected Publications:


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**John D. Spurrier**, Ph. D., Professor and Undergraduate Director, Fellow of the ASA

Website: [http://www.stat.sc.edu/~spurrier/](http://www.stat.sc.edu/~spurrier/)

**Major Research Areas**: Multiple Comparisons, Nonparametrics, Statistics Education

**Brief Description of Major Research Activities**: I love to develop statistical methods that will be useful to practitioners of statistics. The field of multiple comparisons involves comparing three or
more treatments. Early work in this field involved comparing mean responses for the treatments. My most recent work involves comparing the treatments based on the regression relationship between \( Y \) and \( x \). For example, is the relationship between the amount of a chemotherapy agent absorbed in the kidneys (\( Y \)) over time (\( x \)) affected by the administration of other drugs? The mathematical tools that I most often use in multiple comparisons research are calculus, linear algebra, and numerical analysis. The field of nonparametric statistics deals, in part, with analyzing data without assuming that the data follow a normal distribution. My recent work in this field has involved developing nonparametric multiple comparisons methods, forming new approximations to the distribution of a famous nonparametric test statistic, and developing bounds on a probability that arises in nonparametric statistics. The mathematical tools that I most often use in nonparametric statistics are combinatorics and recursive functions. My work in statistical education has centered on developing hands-on learning activities for use in elementary statistics and in a capstone course for senior statistics majors. These help students better understand the role of statistics and the statistician in scientific investigations.

**Personal Statement:** I love wearing three hats. As a researcher, I use computers and mathematics to tackle interesting and challenging problems. As a teacher, I have the opportunity to help students reach their full potential. As a consultant, I learn about exciting research in numerous fields.

**Six Selected Publications:**


- **Peter J. Waddell**, PhD, Associate Professor of Statistical Genetics

**Website:** [http://www.stat.sc.edu/~waddell/](http://www.stat.sc.edu/~waddell/)


**Major research activities:** (1) The first area is the quantitative modeling of DNA sequence evolution. This involves both mathematical and statistical work. The aim is to have a model that describes how sequences evolve on a phylogeny (e.g., evolutionary tree or graph). This can be used to study the evolution of genes given the phylogeny, or it can be used to assess which phylogeny best describes a data set (e.g., tree search), or more problematically, do both at the same time! Models are evolving to the point where we can do such interesting things as estimate the size of ancestral populations (even 80 million years ago) or define which sites in a molecule have been under active or positive selection (and so underline "progressive" evolution or the trend towards an increasing complexity of life over time).

(2) A second area has been using molecular data to elucidate the origins of the placental mammals. Morphologists last century got most of the orders, such as Primates, sorted out but made little progress on super-ordinal relationships. Super-ordinal relationships are important, not least for the major efforts being made into comparative mammalian genomics (e.g., how are mouse, human and cow related). What increasingly appears to be the first substantially correct phylogeny and classification of placental mammals appears in Waddell, Okada and Hasegawa 1999 (Systematic Biology, March 1999, see also Waddell et al. 2001). Major new groups identified in that work include the Laurasiatheria (e.g. cows, whales, horses, carnivores, pangolins, bats and core insectivores) the Fereuungulata (cows to pangolins) and even a new order, the Eulipotyphla (core insectivores, hedgehogs, shrews, moles, and solenodon). Data on this question is now abundant and includes about the aberrant mitochondrial genome (originally a bacterial genome). Using the improved phylogeny, we are presently looking at the molecular evolution of cell cycle genes that are critical to understanding cancer. (Link to publications in this area).

(3) The third area of research is analysis of microarray gene expression data. Work with colleagues in Japan (e.g., Hirohisa Kishino, link) includes first applications of the statistical methods of graphical modeling and APCR in order to help elucidate regulatory networks between genes. Also developed are applications of correspondence analysis and hierarchical clustering for expression data. Microarray experiments and massively parallel proteomics have revolutionized the detail with which we look at what
happens to a population of cells after different experimental treatments. These are the first general pictures of what actually goes on inside a cell. Using microarray technology also allows a comparison of the gene expression profiles of diseases such as cancer, which in turn allows classification of these diseases at a molecular level. (Link to publications in this area).

(4) The fourth area of active interest is in developing improved computational methods and algorithms for problems in molecular evolution and genomics. Present work is focusing on parallelization and implementation of bioinformatics algorithms onto reconfigurable platforms. This work is in collaboration with Duncan Buell, John Rose and Jim Davis. By allowing for the reconfiguration of multiple circuits on a single hardware platform, such approaches offer great promise in relieving the major computational bottlenecks facing genomics.

Why I Like Being a Statistician: In the area of biology, evolutionary biology is one of the most interesting and central areas. It is at the core of the many genome projects completed and underway. Many of the most important questions in this area require better models and refined statistical techniques to interpret the growing mountains of data most accurately. Microarray gene expression data offers many of the same challenges and also has important implications of the future of molecular biology and medical science. Being a quantitative biologist these days without a background in statistics is like being a field biologist without transport; you aren’t going anywhere.

Selected Publications:


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- **Webster R. West**, Ph.D., Associate Professor
  **Website:** [http://www.stat.sc.edu/~west/](http://www.stat.sc.edu/~west/)

**Areas of Research Interests:** Stochastic Modeling, Statistical Computing, Risk Assessment, Change-Point Analysis

**Why I became a statistician?** When I realized that after completing an undergraduate degree in mathematics I was not going to be drafted by any major professional sport, I chose statistics because I wanted to apply mathematics to real world situations.

**What do you like about your job?** I enjoy solving problems from start to finish. Often times that means developing mathematical theory and the computer software to implement it.

**Six selected publications:**