Statistics

Department Information

- **Department Chair:**
  Rhonda Magel, Ph.D.
- **Department Location:**
  Minard Hall 334
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Application Deadline:**
  Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
- **Credential Offered:**
  Ph.D., M.S., Certificate
- **Test Requirement:**
  GRE (recommended)
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Department of Statistics offers programs leading to a Doctor of Philosophy (Ph.D.) in Statistics, a Master of Science (M.S.) degree in Applied Statistics, and certificates in Statistics (for non-majors) and Big Data Applied Statistics Analysis. The program is flexible enough create a plan based on individual prior experience and in accord with professional goals.

During the first year of the program, master's and doctoral students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select a supervisory committee by the end of the first year.

Graduate certificates in Statistics for non-majors and Big Data Applied Statistics Analysis are also available.

Graduate Certificates

- B.S. or equivalent degree from an accredited university,
- Knowledge of College Algebra

Master's Program in Applied Statistics

In addition to the Graduate College requirements (http://catalog.ndsu.edu/graduate/admission-information/), the applicant must:

- Have had at least one year of calculus,
- Have had at least one course in statistics, and
- Have had at least one programming language

Joint Master's Program in Computer Science and Statistics

To be admitted with full status into the M.S. program in computer science and statistics, the applicant must satisfy the admission requirements for both the M.S. program in computer science and the M.S. program in applied statistics.

Ph.D. Program in Statistics

In addition to the Graduate College requirements, the applicant must have an M.S. degree in statistics or related area. Students not holding a master's degree in statistics or a closely related field will not be admitted to the Ph.D. program in statistics. These students must first apply to the M.S. program in applied statistics and complete the M.S. degree.

Ph.D. Program in Statistics with emphasis in Sports Statistics

In addition to the Graduate College requirements, the applicant must have an M.S. degree in statistics or related area and some knowledge or interest in sports.

Financial Assistance

Teaching assistantships are available. To be considered for an assistantship, the application must be complete with the Graduate College no later than March 15.

Statistics Certificate (for non-majors)

- The graduate Statistics certificate requires completion of four statistics courses (12 credits) in total. The first three are: STAT 725; STAT 726 (or STAT 661); and STAT 670 (or STAT 671). The fourth course shall be selected from a pool of available courses, which shall NOT include STAT 700-724.
- Students with little or no prior knowledge of statistics, STAT 725 Applied Statistics must to be the first course taken. No credit will be given for STAT 725 for the certificate if it is not the first course taken.
- Students cannot use both STAT 661 Applied Regression Models and STAT 726 Applied Regression and Analysis of Variance towards the certificate. STAT 726 is recommended.
- Students cannot use both STAT 670 Statistical SAS Programming and STAT 671 Introduction to the R Language towards the certificate.

Big Data Applied Statistics Analysis Certificate

This certificate serves graduate students and working professionals by providing summer online coursework in Big Data Applied Statistics Analysis. Analytics professionals are in demand in this era of big data. Students will learn how to visualize and use statistical learning algorithms to explore big data.

Code	Title	Credits
STAT 712	Applied Statistical Machine Learning	3
STAT 711	Basic Computational Statistics using R	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
Total Credits		**12**

Master of Science in Applied Statistics

The program for the M.S. degree in applied statistics requires 32 semester credits with an overall GPA of 3.0 or higher. An oral defense of a research-based thesis or paper is required.

Code	Title	Credits
Complete a set of core courses* with a grade of B or better, including		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Successfully complete two 1-credit practicums in consulting. Each statistical practicum will be listed as STAT 794		2
Complete an additional 9-12 hours (depends on number of research hours) of course work selected from the following courses:		9-12
STAT 660	Applied Survey Sampling	
STAT 663	Nonparametric Statistics	
STAT 664	Discrete Data Analysis	
STAT 669	Introduction to Biostatistics	
STAT 670	Statistical SAS Programming	
STAT 671	Introduction to the R Language	
STAT 672	Time Series	
STAT 673	Actuarial Statistical Risk Analysis	
STAT 677	Introductory Survival and Risk Analysis I	

STAT 678	Introductory Survival and Risk Analysis II	
STAT 730	Biostatistics	
STAT 732	Introduction to Bioinformatics	
STAT 770	Survival Analysis	
STAT 775	Using Statistics in Sports	
STAT 786	Advanced Inference	
STAT 796	Special Topics	
STAT 851	Bayesian Statistical Inference	
STAT 859	Applied Spatial Statistics	
STAT 798	Master's Thesis	
or STAT 797	Master's Paper	
Must have 15 hours of 700-800 level courses.		

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*If one of these courses has been taken at the undergraduate level, another graduate level course should be substituted. STAT 725 Applied Statistics and STAT 726 Applied Regression and Analysis of Variance will not be counted for this degree program.

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 Probability and Mathematical Statistics I and STAT 768 Probability and Mathematical Statistics II. Exam 2 covers STAT 661 Applied Regression Models, STAT 662 Introduction to Experimental Design and STAT 764 Multivariate Methods or STAT 774 Generalized Linear Models. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Complete and successfully defend the research thesis or paper.

M.S. Degree in Computer Science and Statistics

Code	Title	Credits
Statistics Courses		
STAT 661	Applied Regression Models	3
STAT 671	Introduction to the R Language	3
STAT 669	Introduction to Biostatistics	3
STAT 772	Computational Statistics	3
STAT 732	Introduction to Bioinformatics	3
One additional graduate course in statistics, not including STAT 725 Applied Statistics or STAT 726 Applied Regression and Analysis of Variance		
Computer Science Courses		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 765	Introduction To Database Systems	3
Two additional graduate level courses in computer science.		
Master's Thesis or Master's Paper Research Credits		
Total Credits		**42**

Ph.D. Degree in Statistics

The Ph.D. degree requires an additional 30 credits of course work and 30 hours in research beyond the M.S. degree.

All students must:

1. Complete a set of core courses with a grade of B or better including STAT 661, 662, 767, 768, and 764 or 774. Most of these courses will be completed during your M.S. degree. Without permission, a maximum of two of the courses can be used to count on your plan of study.
2. Complete an additional 30 semester credits of statistics courses at the 600- to 800-level (does not include STAT 711, 712, 713, 714, 725 or 726). At least 15 credits must be at the 700- to 800- level.
3. Students must take STAT 786, STAT 764, and STAT 774 if not taken at the M.S. level.

4. Upon approval by the adviser and supervisory committee, up to 9 hours may be taken in Mathematics or Computer Science. It is recommended that a student have knowledge of real analysis at some level such as MATH 650 Real Analysis I and MATH 750 Analysis.

5. Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 and STAT 768. Exam 2 covers STAT 661, STAT 662 and STAT 764 or STAT 774. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester (fall and spring). A maximum of two attempts is allowed.

6. STAT 899 research credits can not be taken during the first two semester in the graduate program at NDSU. Summer does not count as a semester.

7. Submit your Plan of Study to the Graduate College at least one month prior to your oral preliminary examination, per Graduate College policy.

8. Submit a research proposal and pass an oral exam on the proposal and related topics at least one semester prior to defending your dissertation.

9. Complete and successfully defend the research dissertation.

*Some of these requirements may be satisfied upon admittance into the program with an already existing M.S. degree in Statistics.

Code	Title	Credits
Core Courses		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Additional statistics courses, not including STAT 725 or STAT 726		30
If not taken at the M.S. level, student must take STAT 764, STAT 774, STAT 786.		
STAT 899	Doctoral Dissertation	
Total		**60**

Bong-Jin Choi, Ph.D.
University of South Florida, 2014
Field: Computational Statistics, Machine Learning, Biostatistics, Public Health Research, Big Data Analysis

Ron Degges, Ph.D.
North Dakota State University, 2011
Field: Sampling, Regression Analysis

Rhonda Magel, Ph.D.
University of Missouri-Rolla, 1982
Field: Nonparametrics, Inference Under Order Restrictions, Regression

Megan Orr, Ph.D.
Iowa State University, 2012
Field: Biostatistics, Gene Expression Analysis, High-Dimensional Data, Analysis and Multiple Testing

Gang Shen, Ph.D.
Purdue University, 2009
Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem

Mingao Yuan, Ph.D.
Indiana University-Purdue University, 2018
Field: Network Analysis, Big Data Analysis, Statistical Machine Learning