

# Statistics

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## Program and Application Information

<b>Department Chair:</b>	Dr. Rhonda Magel
<b>Department Location:</b>	Morrill Hall
<b>Department Phone:</b>	(701) 231-7177
<b>Department Email:</b>	ndsus.stats@ndsus.edu
<b>Application Deadline:</b>	Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
<b>Degrees Offered:</b>	Ph.D., M.S., Certificate
<b>Test Requirement:</b>	GRE (recommended)
<b>English Proficiency Requirements:</b>	TOEFL ibT 79 IELTS 6.5

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## Program Description

The Department of Statistics offers programs leading to a Ph.D. in statistics or a master's degree in applied statistics. The program is flexible enough to be individually planned around prior experience and in accord with professional goals.

During the first year of the program, students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select an advisory and examining committee by the end of the first year.

A joint master's degree in computer science and statistics may also be obtained. A graduate certificate in Statistics for non majors is also offered.

## Admissions Requirements

### Graduate Certificate

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

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### Master's Program in Applied Statistics

In addition to the Graduate School requirements (<http://bulletin.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

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### 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.

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### Ph.D. Program in Statistics

In addition to the Graduate School 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.

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### Ph.D. Program in Statistics (with Emphasis in Sports Statistics)

In addition to the Graduate School 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 School no later than March 15.

## Graduate Certificate

The graduate certificate requires 12 semester credit hours consisting of graduate level courses in statistics. STAT 725 needs to be the first course taken for students with little or no prior knowledge of statistics. No credit will be given for STAT 725 for the certificate if it is not the first course taken. Students in the certificate program should not take both STAT 661 and STAT 726. STAT 726 is recommended. Also, students in this program should not take both STAT 670 and STAT 671. After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

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## M.S. Degree 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.

All students must:

### 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 or STAT 774	Multivariate Methods Linear Models I	3
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 or STAT 797	Master's Thesis Master's Paper	

Must have 15 hours of 700-800 level courses.

\*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 Linear Models I. 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

The program for the M.S. degree in computer science and statistics requires 42 semester credits with an overall GPA of 3.0 or higher. This program is designed with an emphasis in big data analysis. An oral defense of a research-based thesis or paper is required.

All students must:

1. Take a minimum of 42 semester credit hours, including at least 18 graduate course credits in computer science and at least 18 graduate course credits in statistics,
2. Take **CSCI 713** Software Development Processes, **CSCI 724** Survey of Artificial Intelligence, **CSCI 732** Introduction To Bioinformatics Introduction to Bioinformatics, **CSCI 765** Introduction To Database Systems and two additional graduate level courses in computer science,
3. Take **STAT 661** Applied Regression Models, **STAT 669** Introduction to Biostatistics, **STAT 671** Introduction to the R Language, **STAT 772** Computational Statistics, **STAT 732** Introduction to Bioinformatics, and one additional graduate level course in statistics (does not include **STAT 725** Applied Statistics or **STAT 726** Applied Regression and Analysis of Variance),
4. Submit a plan of study at least one semester prior to graduation,
5. Pass a comprehensive exam, and
6. Successfully complete a research-based thesis or paper. The supervisory committee must consist of at least one faculty member from computer science and at least one faculty member from statistics.

## Ph.D. Degree in Statistics

The program for the Ph.D. degree requires an additional 30 credits of course work beyond the M.S. degree and 30 hours of research. An oral defense of a dissertation is required. All students entering program must have an M.S. degree in statistics or closely related field. Any core course (or similar course) required for the M.S. degree that has not been taken before entering the Ph.D. program, must be taken before obtaining the Ph.D. degree. This may require additional course work beyond the 30 credits depending on the area in which the M.S. degree was obtained.

Successfully complete two 1-credit practicums in Consulting/Presentation Practicum. Each statistical practicum will be listed as **STAT 794** Practicum/Internship

Complete at least 30 semester credits of statistics courses at the 600- to 800-level (does not include **STAT 725** Applied Statistics **STAT 726** Applied Regression and Analysis of Variance). At least 15 credits must be at the 700- to 800-level. Students must take **STAT 786** Advanced Inference, **STAT 764** Multivariate Methods and **STAT 774** Linear Models I if not taken at the M.S. level.

Upon approval by the adviser and advisory 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 651** Real Analysis II.

- 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** 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. A maximum of two attempts is allowed.
- Submit a research proposal and pass an oral exam on the proposal and related topics.
- Complete and successfully defend the research dissertation.

## Ph.D. in Statistics (with Emphasis in Sports Statistics)\*

This program requires an additional 30 hours in course work and 30 hours in research beyond M.S. degree. Students entering this program should have an M.S. degree in statistics or closely related field. Any core course required for the M.S. degree must be taken before obtaining the Ph.D. in Statistics (with Emphasis in Sports Statistics). This may require additional coursework beyond the 30 credits depending upon the area in which the degree was obtained. Students in this program must:

Complete the following courses

STAT 663	Nonparametric Statistics
STAT 664	Discrete Data Analysis
STAT 671	Introduction to the R Language
STAT 775	Using Statistics in Sports

Complete 15 credits of electives in graduate statistics courses. At least 12 of these credits must be 700- to 800-level. Stat 725 and Stat 726 will not be counted for this degree program. 15

Successfully complete three 1-credit practicums/internships in sports. Each statistical practicum will be listed as – STAT 794 Practicum/ Internship. 3

- 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 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. A maximum of two attempts is allowed.
- Submit a research proposal and pass an oral exam on the proposal and related topics.
- Complete and successfully defend the research dissertation in sports statistics.

\*A student that enters this program with an M.S. degree in statistics or closely related field. Previously taken courses will be evaluated to determine their fit into this program.

**Ron Degges, Ph.D.**

North Dakota State University, 2011  
Field: Sampling, Regression Analysis

**Seung Won Hyun, Ph.D.**

University of Missouri, 2010  
Field: Optimal Designs, Adaptive Designs, Clinical Trials

**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

**Yarong Yang, Ph.D.**

Northern Illinois University, 2010  
Field: Machine Learning, Spatial Statistics, Bayesian Statistics, Bioinformatics