

# 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/) (<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

## Statistics Certificate (for non-majors)

- Students hoping to earn the certificate must take 12 semester credit hours consisting of graduate level courses in statistics.
  - STAT 725 Applied Statistics 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.
  - Statistics courses numbered 700-724 do not count towards this degree.
  - Students in the certificate program cannot receive credit for both STAT 661 Applied Regression Models and STAT 726 Applied Regression and Analysis of Variance STAT 726 is recommended.
  - Students in this program cannot receive credit for both STAT 670 Statistical SAS Programming and STAT 671 Introduction to the R Language.
- Students need to apply to the graduate certificate program (<https://catalog.ndsu.edu/graduate/admission-information/#:~:text=of%20academic%20performance,-Application%20Requirements,-All%20degree%20and>) in Statistics at least one semester prior to completion.
- After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

## Big Data Applied Statistical 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         |
| <b>Total Credits</b> |                                        | <b>12</b> |

## 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   |
|-------------------------------------------------------------------------------|-------------------------------------|-----------|
| <b>Complete a set of core courses* with a grade of B or better, including</b> |                                     | <b>15</b> |
| STAT 661                                                                      | Applied Regression Models           |           |
| STAT 662                                                                      | Introduction to Experimental Design |           |
| STAT 764                                                                      | Multivariate Methods                |           |

|                                                                                                                             |                                            |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| or STAT 874                                                                                                                 | Generalized Linear Models                  |
| STAT 767                                                                                                                    | Probability and Mathematical Statistics I  |
| STAT 768                                                                                                                    | Probability and Mathematical Statistics II |
| Complete an additional 9-12 hours (depends on number of research hours) of course work selected from the following courses: |                                            |
| 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 886                                                                                                                    | Advanced Inference                         |
| STAT 796                                                                                                                    | Special Topics                             |
| STAT 851                                                                                                                    | Bayesian Statistical Inference             |
| STAT 859                                                                                                                    | Applied Spatial Statistics                 |
| <b>Research (Master's Paper 2-4 credits; Master's Thesis 6-10 credits)</b>                                                  |                                            |
| STAT 798                                                                                                                    | Master's Thesis                            |
| or STAT 797                                                                                                                 | 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 874 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.

## 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   |
|---------------------------------------------------------------------------------|--------------------------------------------|-----------|
| <b>Core Courses</b>                                                             |                                            |           |
| STAT 661                                                                        | Applied Regression Models                  | 3         |
| STAT 662                                                                        | Introduction to Experimental Design        | 3         |
| STAT 764                                                                        | Multivariate Methods                       | 3         |
| or STAT 874                                                                     | 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                      |           |
| <b>Total</b>                                                                    |                                            | <b>60</b> |