

Northwestern | THE GRADUATE SCHOOL

Program: Statistics PhD

Graduate Program Goals/Mission Statement:

The mission of the program is to educate students to become leaders in the field of Statistics. Our students learn fundamentals and also develop more specialized knowledge in the graduate classes. So they can learn about recent advances in the field and see how to give a research talk, attendance at department seminars is required. Through their own dissertation work, students push scientific knowledge forward and become adept at communicating their results. In fulfilling TA duties, students learn to be teachers. We provide career mentoring and encourage our students to create professional development plans.

Learning objective(s) <i>Students should be able to...</i>	Milestone/ Requirement/ Capacity	Assessment Strategies and Criteria <i>How do we know this objective has been achieved?</i> <i>What criteria do we have to measure success?</i>
Understand fundamental, key concepts of statistical theory and methods. Be able to apply them in practice.	Qualifying exam/Coursework/Learning	Students are expected to make satisfactory academic progress and pass department qualifying exam. The qualifying exam is a two day, written examination offered at the beginning of the second year of the program. The exam is graded by faculty.
Understand a variety of advanced statistical topics and their applications.	Complete elective courses, attend department seminars/Learning	Students are expected to take six elective courses and make satisfactory academic progress. Students are required to attend department seminars.
Contribute original research to scholarly community. Articulate research results and their impacts.	Dissertation, prospectus/Research, communication	Students write and then orally defend a dissertation, which must demonstrate an original contribution to statistics. The prospectus is the proposal of the dissertation work. Faculty committee reviews the work at the time of the prospectus and dissertation defense.
Teach statistics to undergraduates.	Teaching	Students work as teaching assistants. Help professors teach undergraduate students. Faculty evaluate TA performance and TAs are provided with feedback at the end of each quarter.
Create and communicate professional development plan.	Career development	Student shares plan with advisor at the beginning of each academic year. Student seeks appropriate resources in response to professional development plan.

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I) INTRODUCTION TO THE DEPARTMENT

The Department of Statistics at Northwestern University offers a program leading to the Doctor of Philosophy degree. The doctoral program in statistics is designed to provide students with comprehensive training in statistical theory and methodology and in the application of statistical methods to problems in a wide range of fields. The program is flexible and may be arranged to reflect students' interests and career goals. Cross-disciplinary work is encouraged. The PhD program prepares students for careers as university teachers and researchers and as research statisticians in industry, government and the non-profit sector. A Master's degree program is available to students in doctoral programs in other departments at the University. Students in the doctoral program in Statistics may also earn a Master's degree in Statistics en route to the PhD.

The department is distinguished by the faculty's strong interests in statistical theory and the application of statistics to diverse areas such as public policy, law, medicine and life sciences, and social sciences. Interest in cross-disciplinary work has always been strong – when the department was formed in the 1980s, all of the founding members had appointments in other departments, which included management, engineering, mathematics, education and social policy, sociology, and psychology. The graduate programs offer substantial training in statistical applications and methodology, as well as current advances in statistical theory and computation. Additional information about the Department can be found on our website: <http://www.statistics.northwestern.edu/>.

II) REQUIREMENTS FOR THE PHD DEGREE

The Graduate School has general requirements for PhD students at NU, which can be found at <http://www.tgs.northwestern.edu/academics/degree-requirements/index.html>. Students are required to fulfill the Department requirements in addition to those specified by The Graduate School.

A. Coursework required for MS degree en route to the PhD degree

Students admitted to the PhD program can obtain an optional Master of Science (MS) degree en route. The MS degree requires 12 courses. Required courses include STAT 350 (Regression Analysis), STAT 351 (Design and Analysis of Experiments), STAT 420-1, STAT 420-2, STAT 420-3 (Introduction to Statistical Theory and Methodology I, II, III), and STAT 425 (Sampling Theory and Applications). The remaining courses should be chosen from other 300 and 400 graduate level courses in Statistics, and should include at least two 400 level courses. Approved courses in other departments may also be taken; however, no more than 3 non-statistics courses may be used to fulfill the degree requirements. Independent Study registrations cannot be used to fulfill the coursework requirements. For particularly well-qualified students, the course requirements may be reduced by as many as 3 courses.

B. Additional coursework for PhD students

In addition to the 12 courses listed above, PhD students must take either MATH 450-1, 2 (Probability Theory and Stochastic Analysis I, II) or MATH 450-1 (Probability Theory and Stochastic Analysis I) and IE/MS 460-1, 2 (Stochastic Processes I, II). All PhD students are also required to take STAT 519 (Responsible Conduct of Research Training), typically in their second year of the program. Students generally complete all required coursework in the first two years.

C. Language requirement

All new PhD students whose primary language is not English must fulfill The Graduate School's spoken English proficiency requirement during their first year of study. Students who fail to meet this requirement by the end of their first year of study are not eligible to be teaching assistants, and thus **will not be financially supported by the Department starting in the second year of PhD study**. Details on fulfilling this requirement can be found at <http://www.tgs.northwestern.edu/funding/assistantships/graduate-and-teaching.html>.

The English Language Programs provide language support for international students and scholars; see <http://www.elp.northwestern.edu>.

D. Full-time status

To be [full-time](#), a student must register for no fewer than three courses (and no more than four) authorized for graduate credit per quarter. Students may register for STAT 590 (Research) to maintain full-time registration during quarters in which they are not enrolled in graded coursework, for example during the summer months. Note that full-time status is required in order to receive financial support of any kind or to maintain a valid visa status (e.g. F-1, if it applies). If all coursework has been completed, students may register for TGS 500 to maintain [full-time status](#).

E. Course registration and summer

All students register for classes online through [CAESAR](#). Registration dates are posted on the [Office of the Registrar's Website](#) for each quarter. New graduate student registration typically starts in the last week of summer before the new quarter starts. It is the student's responsibility to comply with all deadlines to complete registration each quarter. In the case that a student has difficulty registering, they may [contact Student Services via e-mail](#). For courses that require permission, students should contact the department that offers the course to obtain a permission number.

Summer registration

It is Statistics Department policy that a full-time PhD student must complete eight quarters of residency consecutively over the first two years, including summers. Summer registration is required for all PhD Students in their first and second years of study, to meet this residency requirement. Students in their third year or beyond are required to register in the summer if they receive funding support from the University.

Approval of course registration

In addition to the required courses, the Department encourages students to take non-STAT courses that are related to their dissertation research. Students are required to consult with their academic advisor or dissertation advisor to obtain approval for course registration each quarter. Taking non-STAT courses (other than those required in Part B) without approval from the Department may result in termination of financial support. Additional rules are given in [TGS guidelines](#).

F. Advisor and thesis committee

Upon arrival at the Department, each new PhD student will be assigned a temporary academic advisor. The temporary advisor will provide the new student with advice on course registration and other issues **before the student selects their dissertation advisor**.

Students should begin to think about selection of their dissertation advisor starting in the later quarters of the first year. The dissertation advisor should be a faculty member or affiliated member of the Department of Statistics. Students are encouraged to learn about the expertise of faculty members from the faculty members' personal webpages, from conversations with more senior students, by attending faculty talks, and by taking independent study courses (STAT 499). It is not uncommon for a student to take multiple independent study courses with different faculty members before they make a decision about whom to work with as an advisor for their dissertation. It is expected that each student will have selected a dissertation advisor by the end of the second year.

The thesis committee should consist of at least three faculty members. Of these three or more faculty members, at least two (including the chair) should be faculty members in Statistics or affiliated with Statistics. In addition to the primary advisor, one committee member could also serve as co-advisor. Students often find it beneficial to include committee member(s) from outside the Department, whose expertise is related to the dissertation research. The thesis committee must be formed before the prospectus examination.

G. Milestones and timeline

The Department has specific requirements for milestones and their timeline, some of which are different from the general [guidelines provided by TGS for PhD students](#).

1. Qualifying exam (beginning of second year)

All PhD students must pass a comprehensive exam (also termed the qualifying exam) in the beginning of the second year of PhD study. This exam will cover the contents of the six core courses listed in part A above. This is also one of the requirements for obtaining a M.S. degree en route to a PhD, in addition to the course work.

2. Prospectus (by the end of third year)

The prospectus is the dissertation proposal, which should include a detailed literature review, preliminary results, and a well-thought-out research plan. The prospectus must be approved by a faculty committee comprised of a committee chair and a minimum of 2 other faculty members. The student should submit a written proposal at least two weeks before the exam. In addition, the student should submit the PhD Prospectus form via the *TGS Forms* tab in [GSTS](#). The DGS must approve this form online before The Graduate School enters final approval. Students are notified via email by The Graduate School of approval of the prospectus.

The Statistics Department requires that students complete their Prospectus before the end of year 3, which is earlier than The Graduate School deadline of the end of year 4 (see <http://www.tgs.northwestern.edu/about/policies/phd-degree-requirements.html#prospectus>). Students may apply for extension of prospectus; however an extension is only granted to students who cannot complete it before the deadline but have demonstrated good progress towards the prospectus. In all circumstances, the prospectus must be completed by the end of the fourth year. **Failure to comply with this deadline will result in exclusion from the PhD program.** Students are responsible for notifying the DGS when they pass their prospectus.

3. PhD Dissertation (typically year 5)

The dissertation must demonstrate an original contribution to a chosen area of specialization. A final examination Thesis Defense is given based on the dissertation. The Thesis Defense presentation typically lasts around 50 minutes. About 15-30 minutes should be given for questions and committee discussion. The student should submit the PhD Final Exam form via the *TGS Forms* tab in [GSTS](#). Each PhD Final Exam committee member must approve the form after the final exam (defense) date. Committee members can render their approval by clicking a link in an email that is automatically generated by GSTS once the exam date passes. Once the dissertation is approved by the thesis committee and all edits and revisions are complete, the student should submit it online for archiving via ProQuest.

4. Graduation

The PhD degree is awarded in December, March, June, and August. Students should refer to the TGS [PhD Degree Completion pages](#) for information on filing requirements and deadlines.

5. Degree deadline

Students have 9 years from matriculation to complete the PhD degree. Only very rarely under extreme extenuating circumstances will students be granted permission to continue beyond 9 years.

III) REQUIREMENTS FOR THE MS DEGREE FOR PHD STUDENTS IN OTHER DEPARTMENTS

The Department offers a MS degree in Statistics for doctoral students in other disciplines who wish to establish their qualifications in statistics and quantitative research methodology. Students are expected to submit their application for the MS in Statistics program prior to starting courses in the Statistics Department. Accepted students will be expected to take a total of 9 courses in a program to be approved by the program director. Two of these courses (STAT 320-1, 2) will ordinarily be required of all students, to provide a foundation in statistical theory. Students should complete 7 other courses selected with the advice and approval of the MS Degree Program Director, at least 4 of which must be taught in the Department of Statistics. Note that the program may be completed entirely from courses taught in the Statistics Department, but may include up to 3 courses from departments other than Statistics with the approval of the program director. All MS candidates are required to complete a culminating activity project using statistics. This project is typically work that will be included in the student's PhD thesis, but can also be a stand-alone project. A tentative list of the courses includes:

Statistics

STAT 320-1, 2 (Statistical Methods I, II) - **Required**
STAT 320-3 (Statistical Methods III)
STAT 325 (Survey Sampling)
STAT 328 (Causal Inference)
STAT 344 (Statistical Computing)
STAT 345 (Statistical Demography)
STAT 348 (Applied Multivariate Analysis)
STAT 350 (Regression Analysis)
STAT 351 (Design and Analysis of Experiments)
STAT 352 (Nonparametric Statistical Methods)
STAT 354 (Applied Time Series Modeling and Forecasting)
STAT 355 (Analysis of Qualitative Data)
STAT 356 (Hierarchical Linear Models)
STAT 439 (Meta-Analysis)

Economics

ECON 381-1, 2 (Econometrics I, II)
ECON 401 (Mathematical Methods of Economic Theory)
ECON 480 (Econometrics)
ECON 481 (Advanced Econometrics)
ECON 482 (Applied Time-Series Econometrics)

Epidemiology and Biostatistics

EPI BIO 501 (Advanced Epidemiology)
EPI BIO 502 (Advanced Biostatistics)

Political Science

POLI SCI 406 (Econometrics)
POLI SCI 407 (Experimental Political Science)

Psychology

PSYCH 405 (Psychometric Theory)

Sociology

SOCIOL 404 (Designs for Descriptive Causal Research in Field Settings)
SOCIOL 476 (Statistical Methods for Hierarchical and Panel Data)

IV) STUDENT AFFAIRS

A. Academic standing

Satisfactory Academic Standing: Every student must maintain a satisfactory academic standing by meeting the standards of the Department and The Graduate School. Please review the TGS general requirements for [satisfactory academic progress](#). In addition to TGS criteria, the Department regards the student to have **unsatisfactory academic standing** if the student: 1) has an overall grade average below B (3.0 GPA) in any quarter; 2) fails the qualifying exam; 3) fails to complete the prospectus exam by the end of third year (without receiving approval from the Department for an extension); 4) fails to complete the prospectus exam by the end of fourth year if granted an extension; 5) does not make satisfactory progress in research; 6) violates Departmental or TGS rules (violations may include, but are not limited to: academic dishonesty, improper conduct, work on-/off-campus without Department and TGS permission, taking non-STAT courses without advisor's approval).

Evaluation: The Department conducts an annual review of each student's academic progress in September via [GSTS](#). Students may logon to GSTS to read their reviews. In addition, the Department conducts informal evaluations of each student in each quarter. Students with unsatisfactory academic standing will be notified.

Probation: When the Department has determined that a student is in unsatisfactory academic standing (see reasons listed above), the student will be placed on probation. When the program places a student on probation, the student and TGS will be notified in writing. The Department may pull the funding of the student on probation based on a case-by-case evaluation.

Exclusion (dismissal): A student who is on probation will be re-evaluated at the end of the probation period. If no satisfactory progress is made, the student will be excluded from the PhD program (the University defines exclusion in the [Student Handbook](#)). When a decision to exclude a student is made by the program, both the student and TGS will be notified in writing within five business days of the decision. The exclusion (dismissal) notification will include the effective date of the exclusion and a clear statement of the reason(s) for exclusion.

Appeal: A student can appeal the Department's exclusion decision to The Graduate School (TGS) within ten days of the date of the Department's written notice of exclusion. Students should submit a written request with supporting materials appealing the decision to the attention of the [Director of Student Services](#). If the appeal is not filed within 10 days, the Department decision becomes final and not subject to appeal. (See the TGS [satisfactory academic progress](#) webpage).

B. Academic integrity

Academic integrity is critical to any scholarly activities. Principles regarding academic integrity can be found on the Office of the Provost's website: <http://www.northwestern.edu/provost/policies/academic-integrity/principles.html>. Every student is required to read, understand, and behave in an academic manner that complies with Northwestern's Basic Standards of Academic Integrity.

Unacceptable behaviors include but are not limited to: cheating, plagiarism, fabrication, obtaining unfair advantage, aiding or abetting academic dishonesty, falsification of records and official documents, unauthorized access to computerized academic or administrative records. Violation of these rules may result in a range of sanctions, possibly including exclusion from the program.

The Department of Statistics considers violations of academic integrity to be very serious. Suspected academic dishonesty will be reported to The Graduate School (TGS) and will be resolved using the process and procedures approved by the Graduate Faculty outlined here: <http://www.tgs.northwestern.edu/about/policies/academic-integrity.html>

If a student has questions about academic integrity, they are strongly encouraged to speak with the DGS or their advisor.

C. Improper conduct

All graduate students should abide by Northwestern rules on discrimination, harassment, and sexual harassment. See <http://www.northwestern.edu/equal-opportunity-access/policies/policy-discrimination-harassment.html> and <http://www.northwestern.edu/sexual-harassment/discrimination/index.html>. Any graduate student who is aware of a violation of these rules should [report](#) it. Please also see the [Resource Guide on Sexual Misconduct and Title IX](#).

Students who are working as Department TAs should familiarize themselves with [Title IX policies](#) and with their responsibilities for sexual misconduct disclosures which are outlined here: <https://www.northwestern.edu/sexual-misconduct/faculty-staff-disclosures-handout.pdf>.

D. Conflict resolution

TGS recommendations for dealing with student-student, student-staff, or student-faculty conflict are outlined here: <http://www.tgs.northwestern.edu/campus-life/dealing-with-conflict.html>. Graduate students are also encouraged to read the [Graduate Education Expectations Document](#) to assist with understanding student-advisor relations.

V) GRADUATE STUDENT LIFE

A. Funding and Duties

Statistics PhD students are typically supported through University fellowships, teaching assistantships, and research assistantships. Students are guaranteed funding for five academic years provided that the student maintains satisfactory academic standing. PhD students are typically supported by a university fellowship in their first year (including summer) and fifth year (including summer) to help students concentrate on core coursework and the dissertation, respectively. In some cases, a student may obtain financial support in the sixth year through a faculty member's research fund or from the Department if a TA position is available, provided that the student has been making satisfactory academic progress.

PhD students are strongly encouraged to apply for external grants during their doctoral careers. Receipt of external awards can have a significant impact on career development. In addition, students receiving external funding may get supplemental pay in addition to their university base salary (see the TGS policy on external funding at <http://www.tgs.northwestern.edu/about/policies/financial-aid-policies.html#external>). See <https://www.statistics.northwestern.edu/graduate/current-phd-students/travel-grants-other-funding.html> for information on funding resources.

Responsible conduct of Research (RCR) training:

Effective January 4, 2010, The National Science Foundation (NSF) mandated that every graduate student supported fully or partially by NSF funding must complete the responsible conduct of research (RCR) training. This training includes two components: online [CITI training](#) and the student must complete STAT 519 (Responsible Conduct of Research Training) organized by the Department at the first available opportunity after they complete the CITI course, if they have not already taken STAT 519.

Teaching assistantship and duties:

Students from the second to fourth year will typically be placed on teaching assistantship. The Department will evaluate a TA's performance each quarter. Unsatisfactory performance in TA work may result in disqualification of funding in future terms (see IV, A – Academic Standing).

Summer fellowship:

Summer fellowship support is contingent upon an approved proposal for summer study (in addition to satisfactory progress toward the PhD degree). Students who will be on a summer fellowship should submit a proposal for summer research before summer quarter starts. The student should consult with their academic advisor or a professor for a summer research topic. By the end of summer, the students should submit a report summarizing their summer research to the Director of Graduate Study.

Students in their third year or later in the program may take a summer internship in industry. Summer fellowships are only awarded to students who work on research full time. Thus students taking a summer internship should not register for STAT 590 or TGS 500 and are not eligible for summer fellowship. Students who plan to work on an internship in the summer are responsible for notifying the Department DGS and administrator as soon as they accept the internship, normally well in advance of the end of spring quarter. Failure to report this may be regarded as improper conduct. International Students will also need to receive authorization to work from the International Office (see V, C: Immigration status).

B. Working on- or off-campus

TGS has rules regarding working paid jobs on- or off-campus in addition to the duties required by the graduate fellowship or graduate assistantship (<http://www.tgs.northwestern.edu/about/policies/financial-aid-policies.html>). Permission to do additional work is required and must be obtained from the both the Department and TGS. The Permission to Work policies and the Graduate Student Permission to Work form can be found at <http://www.tgs.northwestern.edu/about/policies/financial-aid-policies.html#permission>. International Students will also need to receive authorization to work from the International Office if the employment is off campus (see V, C: Immigration status).

C. Life on campus**WildCARD**

Each student will be assigned a Student Identification Number and issued Northwestern's Official ID, a campus Wildcard. The Wildcard can be used to access University buildings, shuttles, purchase food through the University meal plan, and more. [Wildcard Advantage Discounts](#) also offer discounts on some products and services to Wildcard holders. The Wildcard is non-transferable and is the property of NU; the card must be surrendered upon request. If the card is lost or stolen, the student must report it immediately to the Wildcard office (<http://www.northwestern.edu/wildcard/get-a-card/replacing-your-card.html>) and will be liable for the card replacement fee. The Wildcard office is located in the basement of Norris center: <http://www.northwestern.edu/wildcard/index.html>.

NetID

[The NetID](#) is a student's electronic identity at Northwestern. You will use your NetID to access important University systems including, but not limited to:

- University e-mail
- NU online directory
- NU Library online resources
- Grades and transcripts (CAESAR)
- Kronos Time System
- Campus wireless network
- Off-campus access to the NU Network (VPN)

Parking and transportation:

All vehicles parked on the Evanston campus must display a valid parking permit. Parking permits can be purchased at Evanston [Campus Parking Services](#) located at 1841 Sheridan Road, Evanston, IL 60201.

NU provides [shuttle bus service](#) on the Evanston and Chicago campuses, as well as an intercampus shuttle between the two campuses. All NU students have free access to the shuttle bus, obtained by showing a WildCARD. Other public transportation from Evanston to Chicago, as well as other destinations, include [CTA](#) and [Metra](#). All full-time students enrolled in TGS are eligible for a [U-Pass](#) for CTA service, with the exception of those enrolled in TGS 512 (continuous registration).

Housing:

NU [Residential Services](#) provides convenient on-campus apartments for graduate students (Engelhart Hall and the Garrett Place Apartments). Information about off-campus housing can be found at <http://www.northwestern.edu/offcampus/>.

Immigration status:

International students are required to maintain a legal immigration status while they pursue PhD study in the United States. For all full-time international students (F-1/J-1 visa holders), **working off-campus must be approved by the [International office](#) before they start to work. Failure to comply with this may result in exclusion from the program and termination of F-1/J-1 visa status.** When working on-campus F-1/J-1 students are allowed to work up to 20 hours per week while school is in session, and 20 or more hours per week during school breaks and holidays. For information regarding employment please see <http://www.northwestern.edu/international/living-working/student-employment/index.html>.

Purchasing:

NU has free and discounted [software licenses](#) for graduate students. Preferred vendors and other purchase resources can be found at <http://www.northwestern.edu/userservices/purchasing/>.

Additional Useful Links:

- [Legal Services for Graduate Students](#)
- [Health Services](#)
- [Student Health Insurance](#)
- [Counseling and Psychological Services \(CAPS\)](#)
- [Financial Aid Office](#)
- [NUHelp](#) - designed to help students find safety and security resources, academic assistance, and health and wellness programs
- [AccessibleNU](#) - “AccessibleNU serves, supports, and empowers Northwestern students with disabilities by ensuring equal access to fully participate in academic programming and all other facets of University life”
- [Women’s Center](#)
- [Parental Accommodation Policy](#) - covers accommodations available to graduate students who become new parents
- [Child and Family Resources](#)
- [Graduate Student Association \(GSA\)](#)
- [Graduate Leadership and Advocacy Council \(GLAC\)](#) - advocates on behalf of graduate students

VI) GRADUATE STUDENT CAREER DEVELOPMENT

A. Teaching skills

Teaching is an important element of graduate training. NU provides training to teaching assistants at the [New TA conference](#) and [graduate workshops](#). New TAs are required by the Department to attend the New TA conference. For advanced graduate students, NU provides a teaching certificate program through the [Searle Center for Advancing Learning and Teaching](#). Advanced graduate students are strongly encouraged to participate in the teaching certificate program.

B. Department seminar

The Department has a biweekly [seminar](#). **Students are expected to attend all Department seminars**; students should also take advantage of opportunities to meet with seminar speakers. In addition, students are encouraged to speak with their faculty advisor to see if there are additional seminars that would be beneficial for the student to attend.

C. Department reading groups and events

Graduate students are encouraged to take part in department events and opportunities, such as the various reading groups and graduate presentations. If a student has an idea for a group or professional development opportunity, they are encouraged to speak with the Department's administrative assistant or DGS.

D. Conferences

The Department strongly encourages students to attend professional conferences. A student who is presenting their research work at a conference may apply for a TGS travel grant. Students are eligible for a maximum of **two grants** up to \$600 per trip. Students must apply at **least 14 days prior** to their first date of travel. See the [TGS Conference Travel Grant \(CTG\)](#) page for more information and the application.

The Department also contributes up to \$400 to a PhD student's travel during their entire student career at Northwestern. To apply for a Department grant, the student must submit a [Department Conference Travel Grant application](#) to the DGS **at least 30 days prior** to the first date of travel.

E. Professional development plan

The Department provides career mentoring for students. At the beginning of the PhD program, students are encouraged to work with their advisor to create a professional development plan. The plan should be reviewed regularly and updated as needed, at least once per year. Faculty will help students seek appropriate resources in response to the professional development plan.