Graduate Programs Brochure

Introduction

Mathematics, statistics, and data science are growth areas in today's economy and in the nation's universities. New developments including big data, self-driving cars and other wonders of machine learning, high-throughput DNA sequencing and the digitization of biology, ubiquitous sensors collecting data and monitoring processes, the impact of statistics on professional sports, advances in cryptography and computer security, and large-scale climate modeling to understand global warming have all increased the need for a wide variety of pure and applied mathematics, statistics, data science, bioinformatics, and all things computational. These are in addition to well-established areas of application such as biostatistics, insurance, finance, and many others. At the same time, rapid progress is being made on a large number of pure mathematics research topics, making this as exciting a time in mathematics research as ever.

Within higher education, we see consistent strong demand for engaging teachers at the university, college, and community college level. Because many other fields of study from biology to sociology to the humanities are incorporating more mathematics and statistics, there are more opportunities than ever for new classes to teach and for research collaborations across departments, and thus more contributions that can be made by new faculty in mathematics and statistics.

Our master's graduates are successful applied mathematicians, actuaries, consultants, statisticians, and teachers, and many have gone on to Ph.D. programs in our department and at other schools including the University of Michigan and the Ohio State University. Our Ph.D. graduates teach and do research at universities of all types and sizes, others work as statisticians in insurance or pharmaceutical companies, and a few work at the NSA and other government agencies.

None of these possible futures comes easily. You need to learn, to grow, and to see the world and its problems in new ways. We will help you develop your mathematics, statistics, and computational skills through a wide variety of courses available at the master's and Ph.D. level.

The Department of Mathematics and Statistics at Bowling Green State University is well equipped with 16 full-time research faculty with Ph.D. degrees, to respond to the needs of mathematics and statistics students. In addition, there are 10 research faculty members in the Department of Computer Science, 6 in the Department of Applied Statistics and Operations Research, and 3 faculty members with specializations in mathematics education in the Department of Educational Curriculum and Instruction. The Department of Mathematics and Statistics is located in Mitchell B. McLeod Hall and most classes we teach are held in this same building. In addition to formal courses, we offer a variety of informal seminars and a weekly colloquium where mathematicians and statisticians of international reputation present talks.

The placement record of our advanced degree recipients has been excellent. Our master's graduates of recent years are split fairly evenly between the teaching profession and business. Our first Ph.D. student graduated in 1975. Of the Ph.D. graduates since then, a recent survey found that they have obtained positions at four-year colleges, universities and research institutes or have jobs in financial firms, government, or industry commensurate with their training. Ph.D. dissertations have been written in the areas of algebra, complex analysis, functional analysis, inverse problems, scientific computation, probability, statistics, biostatistics, and bioinformatics. Current research interests of the faculty include combinatorics, functional analysis, groups and geometries, inverse problems, mathematics education, operator theory, ordered algebraic structures, probability, statistics, biostatistics, bioinformatics, and scientific computation.

Programs

Master of Arts (MA)

The M.A. degree program is quite flexible and is designed to prepare for entry into the job market or for further study in a variety of fields such as mathematics, statistics, computer science, applied mathematics, operations research, economics and/or finance. Formal programs are offered in mathematics, statistics, and applied mathematics/scientific computation. Each program of study is based on a required core area supplemented by a combination of elective course work in mathematics, statistics, and computer science.

The requirements for the M.A. degree are as follows:

1. Core course work. Completion of either (a), (b), or (c):

    (a) **Mathematics**: a two-semester sequence in algebra (6330-6340) and a two semester sequence in real analysis (6650-6660)

    (b) **Statistics Specialization**: real analysis (5650 or 6650), a two-semester sequence in mathematical statistics (6410-6420), two additional courses from among 6440, 6450, 6460, 6470, 6480, 6490, 6570, 6710, 7400, 7450, 7460, 7550, 7560, 7570, 7580, 7590 and any approved 6820 topics course

    (c) **Applied Mathematics/Scientific Computation Specialization**: real analysis (6650), four courses in applied mathematics/scientific computation. (5390, 6180, 6200, 6680)

2. Completion of at least 30 semester hours of approved graduate level course work in mathematics and statistics, 18 hours of which must be at the 6000 level or higher.

3. Completion of a master's thesis (counting for up to six credit hours) or successful completion of a written comprehensive examination based on the core course work.

Statistics students interested in **Actuarial Science** may augment their preparation for the SOA/CAS Examinations by taking the following courses: Exam P/I: 5410, 5420; Exam FM/2: 5250; Exam LTAM: 5260, 5270; Exams PA and SRM: Math 5440, Stat 5020, Stat 5160.

Master of Science in Applied Statistics (MS)

The M.S. in Applied Statistics degree is offered jointly by the Department of Mathematics and Statistics and the Department of Applied Statistics and Operations Research. This program prepares the student for a career as a statistician in business, industry, or government or for further study toward a Ph.D. degree with specialization in applied statistics.

The requirements for the M.S. in Applied Statistics are as follows:

1.

Required Courses	Required Courses	Select 5 Electives from below must include 6 credit hours **MATH** and 6 credit hours **STAT/OR** and 3 at the 6000 level		
STAT 5020	MATH 6410	**STAT**	**MATH**	
STAT 5060	MATH 6420	5120	5260	6490
STAT 5080		5140	5270	6570
		5160	5450	6710
		6200	5470	6720
		6300	5650	7400
		6340	5660	7550
		6440	6440	7560
		OR 6610	6450	7570
		OR 6620	6460	7580
			6470	7590
			6480	

2. At least one 3-hour course at the 5000 or 6000 level offered by the Department of Mathematics and Statistics in the Fall and Spring Semesters.
3. At least 18 credit hours at the 6000 or 7000 level.
4. Plan I, thesis option. Completion of a master's thesis (including three credit hours of Math 6990) and one additional elective from the courses listed above, for a total of at least 36 credit hours.
5. Plan II, comprehensive examination option. Successful completion of a comprehensive examination over the required courses listed above, plus Stat 6750, for a total of at least 33 credit hours.

The prerequisites for the program are undergraduate course work in advanced calculus, linear algebra, probability, and statistical inference, although some of this coursework can be completed on a remedial basis after admission.

Ph.D. - Mathematics

The Ph.D. in Mathematics is a research degree. Students may enter the Ph.D. program if they have a Master's degree from an accredited university and meet admission requirements at Bowling Green State University. Students who successfully complete the Master's program at BGSU and wish to continue for the Ph.D. must also apply for admission to the Ph.D. program.

The doctoral program requires a minimum of 60 hours of graduate credit beyond the Master's degree. A dissertation (minimum of 16 credit hours, maximum of 30 credit hours) consisting of original research is required and must be judged to be of publishable quality.

In addition to completing the requirements for one of the M.A. tracks above, students must obtain a grade of B or better from at least 8 of the following 12 courses:

Algebra: 7330, 7340 (or 7350 with permission of the graduate coordinator)	Topology: 6510, 7520
Analysis: 7650, 7660	Partial Differential Equations: 7120, 7130
Complex Analysis: 6610, 7620	Probability: 7410, 7420

A student becomes qualified to take the Ph.D. Preliminary Examination upon passing the Ph.D. Qualifying Examination. The Qualifying Examination is in two areas of the student's choice from among the six areas listed in the table above. A student becomes a doctoral candidate upon passing the Ph.D. Preliminary Examination. The intent of the Preliminary Examination is to prepare students for their dissertation research. The Preliminary Examination consists of a written report and an oral exam.

Ph.D. - Statistics

The Ph.D. in Statistics is a research degree. Students may enter the Ph.D. program if they have a Master's degree from an accredited university and meet admission requirements at BGSU. Students who successfully complete the master's program at BGSU and wish to continue for the Ph.D. must also apply for admission to the Ph.D. program.

The doctoral program requires a minimum of 60 hours of graduate credit beyond the Master's degree. A dissertation (minimum of 16 credit hours, maximum of 30 credit hours) consisting of original research is required and must be judged to be of publishable quality.

Required Courses	Five (5) Electives From
Analysis: 6650 Probability: 7410 Statistics: 6570, 7450, 7460, 7550, 7560, 7570	MATH 6440, 6450, 6460, 6470, 6480, 6490, 6710, 6720, 7400, 7420, 7430, 7580, 7590 and any approved MATH 6000+ or STAT 6000+ letter-grade topic courses.

Students must earn a B or better in Math 6570, 7410, 7450, 7460, 7550, 7560, and 7570.

A student becomes qualified to take the Ph.D. Preliminary Exam upon passing the Ph.D. Qualifying Exam. The Qualifying Exam is in two areas from among 6570/7580, 7410/7420, 7450/7460, 7550/7560, and 7570/7590. Students intending to write a dissertation in the field of statistics are suggested to take 7450/7460 and choose one of the following exams: 6570/7580, 7550/7560, or 7570/7590; while students intending to write a dissertation in the field of probability are suggested to include 7410/7420.

A student becomes a doctoral candidate upon passing the Ph.D. Preliminary Examination. The intent of the Preliminary Examination is to prepare students for their dissertation research. The Preliminary Examination consists of a written report and an oral exam.

MS and Ph.D. – Data Science

The Master of Science and the Ph.D. in Data Science are offered jointly by the Department of Mathematics and Statistics, the Department of Computer Science, and the Department of Applied Statistics and Operation Research. The first cohort of students started in Fall 2019. The Ph.D. in Data Science is a research degree. Students with a Master's degree in Statistics or Computer Science and with sufficient course work in both fields may apply to enter directly into the Ph.D. program. Students with inadequate background may start in the Master's in Data Science.

See https://www.bgsu.edu/academics/graduate/data-science-phd.html for more information about the Ph.D. program in Data Science.

Tenure-Track Faculty

Bes, Juan, Ph.D., Kent State University	Professor; Operator Theory, Functional Analysis
Bujakowski, Douglas, Ph.D., University of Wisconsin-Madison	Associate Professor; Actuarial Science, Risk & Insurance
Chan, Kit, Ph.D., Univ. of Michigan	Professor; Functional Analysis, Function Theory
Chen, John Tuhao, Ph.D. University of Sydney	Professor; Biostatistics, Multivariate Analysis
Chou, So-Hsiang, Ph.D., University of Pittsburgh	Professor; Numerical Analysis, Fluid Mechanics
Ghosh, Riddhi, Ph.D., Texas A&M University	Assistant Professor; Bayesian Statistics, Covariance Matrix Modeling and Estimation, High Dimensional Data, Correlated Data, Longitudinal Data, Missing Data
Islambekov, Umar, Ph.D., University of Texas at Dallas	Assistant Professor; Applied Topological Data Analysis, Functional Data Analysis, Bayesian Statistics, Nonparametrics, Machine Learning
Meel, David, Ed.D., University of Pittsburgh	Professor; Mathematics Education
Nguyen, Diem, Ph.D., Texas A & M University	Associate Professor; Mathematics Education
Ning, Wei, Ph.D., Syracuse University	Professor; Empirical Likelihood; Change-point Analysis; Time Series Analysis; Sequential Analysis; Skew Distributions; Mixture Models; Causal Inference.
Rogers, Kimberly, Ph.D., Michigan State University	Professor; Mathematics Education
Shang, Junfeng, Ph.D., University of Missouri **Chair**	Professor; Model selection, multiple comparison, Bayesian analysis
Staic, Mihai, Ph.D., SUNY, Buffalo **Undergraduate Coordinator**	Professor; Algebra
Sun, Tong, Ph.D., Texas A & M University **Assistant Chair**	Professor; Applied Mathematics, Numerical Analysis
Ward, Benjamin, Ph.D., Purdue University **Graduate Coordinator**	Associate Professor; Algebra, Topology
Xie, Xiangdong, Ph.D., University of Utah	Professor; Geometric Group Theory and Geometric Analysis

Assistantship Funding

The department provides approximately 55 teaching assistantships ($14,000/Master's - $18,540/Ph.D. level, for the academic year) and tuition scholarships that cover instructional and non-resident fees. Funded students are provided with an office in Mitchell B. McLeod Hall. Additional summer support with stipend ($1,000—$2,000) and tuition scholarship is available to continuing funded students. A small number of additional summer scholarships are made possible by generous benefactors of the department.

All new funded graduate students are invited to participate in the Summer Head Start Program which runs during six weeks from late June to early August. The Program carries a stipend and includes tuition for up to 6 credit hours of coursework. The focus of the Program is a teaching seminar aimed at easing the transition to classroom teaching duties in the fall. Participants may also have the opportunity to take a class in mathematics or statistics for graduate credit. International students may take an English course especially designed for new graduate students.

All classes taught by the Department are small individual sections of 7-29 students—we offer no large lecture classes. Teaching assistants are assigned small individual classes in college algebra, calculus, precalculus (Math 1300 and below), quantitative reasoning, or Statistics (Math 1150), or are assigned to teach college algebra in the Math Emporium. This involves five to six contact hours per week with undergraduate students. Most classes are taught in Mitchell B. McLeod Hall.

Statistics students may seek a consultant's position at the University's Center for Business Analytics. These positions provide valuable experience for those preparing for careers in statistics. The stipends in the CBA are the same as for teaching assistants. Students may also seek an assistantship in the University's Learning Commons.

Assistantship decisions are made by **March/April**. Incomplete applications are not reviewed for funding consideration.

General Information

Computing Facilities

Varied departmental and university computing facilities are available to graduate students. Access is available to the systems at the Ohio Supercomputer Center for appropriate projects.

Each graduate student office has a desktop computer for word processing, email, small scale computing, and connection to the campus network, including the library catalog and the internet. WIFI is available throughout the building. There is also a graduate student workroom that houses a laser printer and Windows machines. Most classrooms are equipped with ceiling-mounted projectors.

University facilities include open labs with Mac and Windows computers. Major software available includes SAS, SPSS, Minitab, MATLAB, and Maple.

Location, Cultural and Recreational Activities

Bowling Green, Ohio, a pleasant university town with a population of 30,000, is located about 20 miles south of Toledo, Ohio on Interstate 75.

The university sponsors a wide variety of cultural events including concerts (many of them free) in the Musical Arts Building, theatre performances, and guest speakers. Toledo has a symphony orchestra and one of the country's finest art museums.

There are abundant recreational facilities at the University. The highlight is the Student Recreation Center which has two swimming pools (one Olympic-sized), basketball, squash, and racquetball courts, tennis courts, weightlifting and aerobic fitness rooms, a track, sauna, and many other facilities. The University also has a modern ice arena.

Contact:

For additional information on our degree programs, funding opportunities, faculty research strengths, course descriptions, recent employers of our graduates, graduate student directory and more, please visit our website at: https://www.bgsu.edu/arts-and-sciences/mathematics-and-statistics or contact:

Benjamin Ward, Ph.D.	Terrilyn Meel
Graduate Coordinator	Graduate Secretary
email: benward@bgsu.edu	email: mathgradsecy@bgsu.edu
419-372-7472	419-372-2637

How To Apply For Admission/Assistantship

To start in Summer 2025 or Fall 2025

The deadline for full consideration for admission and funding is January 31, 2025.

BGSU uses an all-electronic application system. Apply online at: **gradapply.bgsu.edu/apply**.

There, you will:

- upload electronic scans of transcripts from all colleges or universities attended (after admission, you will need to send BGSU official paper transcripts from each institution where you earned a degree)
- upload a statement of purpose
- list three faculty or professionals who can upload a letter of recommendation in support of your application; the application system will contact them by email
- submitting your GRE General Test results is optional. If you wish to submit your GRE General Test scores, send to BGSU using **Institution Code: 1069**
- international students, list your TOEFL or IELTS scores. Have TOEFL or IELTS scores sent to BGSU. Students from certain countries are exempt. Students with an undergraduate or master's degree from a university in the United States do not need to provide TOEFL or IELTS score reports.
- pay a non-refundable application fee ($45 domestic, $75 international)
- indicate your interest in being considered for a teaching assistantship (Note: Assistantship decisions are made in March/April and offers go out shortly after that).
- indicate the program you wish to pursue:
  - Master of Arts in Mathematics, choose Mathematics – MA
  - MA specialization in Statistics, choose Mathematics: Statistics – MA
  - MA specialization in Applied Mathematics / Scientific Computation, choose Mathematics: Applied Mathematics / Scientific Computation – MA
  - Master of Science in Applied Statistics, choose Applied Statistics (Math) – MS
  - Ph.D. in Mathematics, choose Mathematics – Ph.D.
  - Ph.D. in Statistics, choose Statistics – Ph.D.
  - Ph.D. in Data Science, choose Data Science - Ph.D.

If you are an international student and are admitted to BGSU, please follow the instructions on the International Student Services webpage in order to obtain your non-immigrant documents. Please do this promptly after admission to avoid any delays. See www.bgsu.edu/graduate/admissions for more information on the application process at BGSU.

To start in Spring 2025

Use the same application process as above. International students should apply by November 1, 2024, domestic students by December 1, 2024. Note that assistantship funding is not always available for spring starts, and it is always competitive. Also note that it is very difficult for Ph.D. students to start in the Spring semester because the key courses are offered as fall-spring sequences, and one typically cannot start with the second course in the sequence.