THE OHIO STATE UNIVERSITY

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Program Guide to Undergraduate and Graduate Studies in Statistics and Biostatistics

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For the most updated version of this document, please see the Department of Statistics website at www.stat.osu.edu.

UNDERGRADUATE MAJOR IN DATA ANALYTICS PROGRAM

Data analytics applies fundamental scientific principles to the analysis of large, complex data sets. This rapidly growing field needs practitioners with expertise that cuts across core disciplines of computer science, mathematics and statistics, AND highly developed critical thinking, problem-solving and communication skills.

Data analytics is a uniquely interdisciplinary major with academic partnerships rarely found in other majors. Data analytics majors receive a Bachelor of Science (BS) degree from the College of Arts and Sciences through curricular partnerships with the College of Engineering, the College of Medicine and the Fisher College of Business. The major is jointly administered by the Department of Computer Science and Engineering and the Department of Statistics.

Additional information can be seen on the program's website: https://data-analytics.osu.edu/.

UNDERGRADUATE MINOR IN STATISTICS PROGRAM

A demonstrated knowledge and working understanding of basic statistical techniques and methods has become a critical element for students in many disciplines including business, engineering, life sciences and social sciences. The undergraduate minor in statistics is designed as a valuable asset to enhance most undergraduate majors and their career opportunities.

Course Requirements

To achieve the statistics minor, the student must successfully complete the requirements listed in (1.) and (2.) below. A minimum of 15 semester credit hours is required for the statistics minor.

(1.) Take and pass with a grade of C- or above in each of the required courses.

Stat 4201 (4)	Introduction to Mathematical Statistics I
Stat 4202 (4)	Introduction to Mathematical Statistics II
Stat 5301 (4)	Intermediate Data Analysis I
Stat 5302 (3)	Intermediate Data Analysis II

(2.) Maintain a minimum cumulative grade point average of 2.00 in the statistics minor.

(3.) Stat 4201 is not required for Math students with credit for Math 4530 (Probability) or Math 5530H (Rigorous Probability). However, Math 4530 or Math 5530H cannot be counted for credit in the Statistics minor. Students with Math 4530 or Math 5530H but not Stat 4201 will have to take 4 semester hours of electives (see next note for a list of possible electives).

(4.) In addition to the required courses, it is recommended but not usually required that the student take one or more electives from such specialized courses as Statistical Foundations of Survey Research (5510), Introductory Time Series Analysis (5550), or Introduction to SAS Software (5740). Other electives may be selected with the approval of the Undergraduate Minor Coordinator.

Sample Undergraduate Minor in Statistics Programs

	SAMPLE PROGRAM A	
	Autumn	**Spring**
Year 1	5301	5302
Year 2	4201	4202

SAMPLE PROGRAM B	
Autumn	**Spring**
4201	4202
5301	5302

Note: Any student who began the minor under quarters should consult with the Undergraduate Minor Coordinator.

MASTER OF APPLIED STATISTICS PROGRAM

The goal of the Master of Applied Statistics (MAS) is to prepare graduate students to enter positions in applied statistics in business, industry, or government. The program is typically 2 years and requires a minimum of 33 credit hours of coursework, of which 28 hours are required courses. Students without sufficient background in mathematics may be required by the Graduate Studies Committee to take additional courses to correct these deficiencies. The Graduate Studies Chair serves as the advisor for all MAS students.

Students in the MAS program are subject to the policies set forth by the OSU Graduate School. See the Graduate School Handbook for details.

Course Requirements (33 hours)

Core (28 hours)	6301 (3)	Probability for Statistical Inference
	6302 (3)	Theory of Statistical Analysis
	6410 (4)	Design and Analysis of Experiments
	6450 (4)	Applied Regression Analysis
	6560 (3)	Applied Multivariate Analysis
	6570 (2)	Applied Bayesian Analysis
	6610 (3)	Applied Nonparametric Statistics
	6650 (2)	Discrete Data Analysis
	6730 (2)	Introduction to Computational Statistics
	6750 (2)	Statistical Consulting and Collaboration
Electives (5 hours)		Any 5 hours of **approved** elective courses (Usually statistics courses - See Note #3 below)

Sample MAS Course Program

First Year	**Autumn**	**Spring**
	6301 (3)	6302 (3)
	6450 (4)	6410 (4)
	6610 (3)	Elective

Second Year	**Autumn**	**Spring**
	6560 (3)	6570 (2)
	6730 (2)	6650 (2)
	6750 (2)	Elective

Notes on the Course Requirements

1. Required MAS courses taken as an undergraduate at OSU must be replaced with approved graduate elective hours unless the courses were taken through senior petition or a combined program and approved by the Graduate Studies Committee. Satisfactory completion of Statistics 6801 and 6802 may be used to replace Statistics 6301 and 6302. Upon petition to the Graduate Studies Committee, required courses may be omitted if there is evidence of substantially equivalent study elsewhere, but they must be replaced with approved electives. Such modifications to required courses do not affect the content of the MAS examination or the total credit hours required for the degree.

2. Courses with a grade below B- do not count toward the degree and must be replaced by courses

approved upon petition to the Graduate Studies Committee. Note that all graduate students are required to maintain a cumulative GPA of at least 3.0 both overall and in their statistics courses in order to remain in good standing.

3. Electives: No additional hours of Statistics 6750 (beyond the two required hours) may be counted as electives. All other letter-graded 6000-level statistics courses (except 6030, 6040, 6060, 6201, 6740, 6801, 6802, 6910, and 6950), including their cross-listed equivalents, are approved electives. In addition, upon special approval of the Graduate Studies Committee, some 7000- and 8000-level courses may be counted as electives. Students may, with approval of the Graduate Studies Committee, substitute one course (up to 3 hours) from another department in place of an elective. The course must have appropriate content for a statistics degree, but may not duplicate the material covered in any course available from the Department of Statistics.

MAS Examination

A passing score on the MAS Examination is required for graduation. The MAS Examination is given in January, and a second offering is given in May if at least two students who failed the first offering wish to retake the exam. Each offering of the exam is administered in two sessions: (1) a two-hour period covering the concepts and techniques presented in Statistics 6301 and 6302, and (2) a three-hour period covering material in Statistics 6410, 6450, 6560, and 6610. Both parts of the examination are open book. A student is permitted a maximum of two attempts at successful completion of the examination.

Forms

Each student is required to submit to the Graduate Studies Committee Chair the departmental MAS Plan of Study & Application to Graduate form by the end of his/her first year of study and absolutely before filing the Graduate School's Application to Graduate form. Any subsequent modifications in this Plan of Study will require approval of the Graduate Studies Committee. The student must also submit the online Graduate School Application to Graduate form via GRADFORMS.OSU.EDU by the published deadline of the Graduate School (the third Friday of the term of intended graduation). Please consult the Graduate School website for details.

Note: Any student who began the program under quarters should consult with the Graduate Studies Chair.

MASTER OF SCIENCE IN STATISTICS PROGRAM

The Master of Science (MS) degree program can provide preparation for a career in applied statistics or it can be composed primarily of the first two years of coursework for either the Statistics PhD program or the methodology specialization of the Biostatistics PhD program. The requirements for the MS are more theoretical than those for the MAS. The MS degree may be awarded by one of two different routes: Thesis or Non-thesis. Under either route, the MS may be a terminal degree. The Non-thesis route may serve as a steppingstone to the PhD degree if later admitted to the PhD program. Students in the MS program will generally be in residence for two academic years, or more if continuing for the PhD. This may result in the student accumulating more than the required number of credit hours or at times being able to take a lighter load. The MS requires a minimum of 36 credit hours.

Students in the MS program are subject to the policies set forth by the OSU Graduate School. See the Graduate School Handbook for details.

Course Requirements (36 credit hours)

Core (25 hours)	6801 (4), 6802 (4)	Statistical Theory I & II
	6860 (2)	Foundations of the Linear Model
	6910 (4), 6950 (4)	Applied Statistics I & II
	7410 (3)	Theory of the Linear Model
one of	6570 (2)	Applied Bayesian Analysis or
	6615 (2)	Design and Analysis of Clinical Trials
one of	6750 (2)	Statistical Consulting and Collaboration or
	7755 (2)	Biostatistical Collaboration
Electives (11 hours)		11 hours of **approved** elective courses appropriate to the Thesis or Non-Thesis option as described in (2a) or (2b) below

Sample MS in Statistics Course Program

First Year	**Autumn**	**Spring**
	6801 (4)	6802 (4)
	6910 (4)	6950 (4)
	Elective	6860 (2) - 1st half sem.
		6570 (2) - 2nd half sem.

Second Year	**Autumn**	**Spring**
	7410 (3)	Elective
	6750 (2)	Elective
	Elective	Elective

(1) All Courses – Must be taken and passed with a grade of B- or above in a letter-graded course and with a grade of S in a S/U course. Note that all graduate students are required to maintain a cumulative GPA of at least 3.0 both overall and in their statistics courses in order to remain in good standing.

(2a) Thesis Option – Write a thesis and pass an oral examination in defense of this thesis.

Electives* (11 hours): Letter graded Statistics courses at the 6000-level or above, excluding Statistics 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6740, 7193, 7194, 8010, 8193, 8194, 8895, 8999. Neither 6750 nor 7755 may be counted for elective credit. At most four hours of thesis preparation under Statistics 7998 or Statistics 7999 may be counted among the 11 hours of electives. Up to four hours of Statistics 8750.xx may be counted.

(2b) Non-thesis Option – Pass a written examination that is offered at the same times as the PhD Qualifier I Examination (May, and a second offering is given in August if at least two students who failed the first offering wish to retake the exam). The examination will cover material from the first year of the MS coursework. A student is permitted a maximum of two attempts at successful completion of the examination.

Electives* (11 hours): Letter graded Statistics courses at the 6000-level or above, excluding Statistics 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6740, 7193, 7194, 7998, 7999, 8010, 8193, 8194, 8895, 8999. Neither 6750 nor 7755 may be counted for elective credit. Up to four hours of Statistics 8750.xx may be counted. Statistics 7998 and Statistics 7999 may not be counted as elective hours for a non- thesis option degree.

* Students may also take appropriate graduate courses outside the Statistics Department to meet the elective requirements. Students may, with approval of the Graduate Studies Committee, substitute one course (up to 3 hours) from another department in place of an elective. The course must have appropriate content for a statistics degree, and must not duplicate the material covered in any course available from the Department of Statistics.

Notes on the Two Options

The department views either the thesis or non-thesis option as acceptable. However, the department does not view either option as an alternative once the other option has resulted in failure. To this end, a student should declare his/her intentions to the Graduate Studies Committee at the end of his/her first year of study via the Plan of Study form (see below).

Since most students in recent years have elected to take the MS degree via the non-thesis option, a few words about the MS degree with thesis are in order. Some professors have problems that are suitable for masters' theses. These topics can range from the very mathematical to applications in other fields. Some thesis topics could be direct extensions of problems arising in the Statistical Consulting Service. A thesis written on such a problem converts the degree to an applied degree, in substance, if not in name. A student wishing to learn more about the thesis option, should talk with his/her advisor. The Graduate Studies Chair serves as the advisor for all MS students unless the student chooses to pursue a thesis with another faculty member.

Forms

Any student who anticipates obtaining the MS degree in the course of his/her academic career should file the departmental MS Plan of Study & Application to Graduate form by the end of his/her first year of study and absolutely before filing the Graduate School's Application to Graduate form. Any subsequent modifications in this Plan of Study will require approval of the Graduate Studies Committee. The student must also submit the online Graduate School Application to Graduate form via GRADFORMS.OSU.EDU by the published deadline of the Graduate School (the third Friday of the term of intended graduation). Please consult the Graduate School website for details.

Note: Any student who began the program under quarters should consult with the Graduate Studies Chair.

PHD IN STATISTICS PROGRAM

The PhD program in statistics presupposes a mathematical background which includes linear algebra and advanced calculus. The core of the PhD program consists of coursework in mathematical statistics, applied statistics, and computational methods. The typical time to degree is 5 years.

(1) The student must take and pass the coursework described below with a grade of B- or above in a letter-graded course and with a grade of S in a S/U course. Note that all graduate students are required to maintain a cumulative GPA of at least 3.0 both overall and in their statistics courses in order to remain in good standing.

(2) The student must pass all examinations as described below.

(3) The student must satisfy university rules on residency and total credit hours. A minimum of 80 credit hours is required, which typically includes a considerable number of hours of Statistics 8999 (PhD Research).

Students in the PhD program are subject to the policies set forth by the OSU Graduate School. See the Graduate School Handbook for details.

Course Requirements (80 credit hours)

Mathematics		As required for individual students to reach the mathematical maturity necessary to be successful in the Statistics courses 7201, 7301, 7302, 7303, and 7540. Minimum requirements should be the equivalent of a strong undergraduate course in Advanced Calculus or Real Analysis and Math 4545 (4)
Core (43 hours)	6570 (2)	Applied Bayesian Analysis
	6801 (4), 6802 (4)	Statistical Theory I & II
	6860 (2)	Foundations of the Linear Model
	6910 (4), 6950 (4)	Applied Statistics I & II
	7201 (3)	Theory of Probability
	7301 (3), 7302 (3)	Advanced Statistical Theory I & II
	7303 (3)	Bayesian Analysis and Decision Theory
	7410 (3)	Theory of the Linear Model
	7540 (3)	Theory of Stochastic Processes
	7730 (3)	Advanced Computational Statistics
one of	6750 (2)	Statistical Consulting and Collaboration or
	7755 (2)	Biostatistical Collaboration
Electives* (14 hours)		At least 14 credits of letter-graded Statistics at the 6000-level or higher, of which at least 11 credits must be at the 7000-level or higher
Statistics Seminar	8895 (1)	After passing the Q1 exam, students should enroll in this course each autumn and spring semester.

Research Topics Seminar	8010 (1)	Students are to enroll in Statistics 8010 in the spring semester of their second year.
Dissertation Research	8999 (3)	After passing the candidacy exam, students are required to enroll in 3 credit hours each autumn and spring semester. Students typically fulfill this requirement by enrolling in 8999 with their advisor.

Sample PhD in Statistics Course Program

First Year	**Autumn**	**Spring**
	6801 (4)	6802 (4)
	6910 (4)	6950 (4)
	Math 4545 (4)	6860 (2) - 1st half sem.
		6570 (2) - 2nd half sem.
Second Year	**Autumn**	**Spring**
	7201 (3)	7302 (3)
	7301 (3)	7303 (3)
	7410 (3)	7540 (3)
	Elective	8010 (1)
Third Year	**Autumn**	**Spring**
	7730 (3)	Elective
	6750 (2)	Elective
	Elective	Elective

***Notes on the Elective Requirement:**

Excludes Statistics 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6740, 6750, 7193, 7194, 7755, 7998, 7999, 8010, 8193, 8194, 8891, 8895, and 8999.

Students may also take appropriate graduate courses outside the Statistics Department to meet the elective requirements. Students may, with approval of the Graduate Studies Committee, substitute one course (up to 3 hours) from another department in place of an elective. The course must have appropriate content for a statistics degree, and must not duplicate the material covered in any course available from the Department of Statistics.

Up to four hours of Statistics 8750.xx may be counted toward the degree requirements, as may Statistics 8410.

Examinations

Note on all exams: Students are expected to take exams on the usual schedule as they complete coursework in order for funding (if applicable) to continue. None of these examinations may be taken more than twice. See the Graduate School website for details on examination requirements.

1. Qualifier I: This written examination covers material from the first year of coursework. It is offered in May, and a second offering is given in August if at least two students who failed the first offering wish to retake the exam.

2. Qualifier II: This is a comprehensive written examination testing knowledge acquired in the first two years of study and the ability to integrate and apply such knowledge. It will cover material from the first two years of coursework. It may not be attempted until Qualifier I has been passed. It is offered in August, and a second offering is given in January if at least two students who failed the first offering wish to retake the exam.

   After passing Qualifier II, the student chooses a dissertation advisor, who must be a Category P graduate faculty member. (Prior to passing the Qualifier II, the Graduate Studies Chair serves as the advisor). Category P faculty have been approved by the university to formally supervise PhD dissertations. After the dissertation advisor is chosen, the student also forms a PhD Candidacy Examination Committee, consisting of at least four graduate faculty members from the Statistics Department or other departments consistent with the student's interests. This committee is responsible for approving a Plan of Study form to be filed with the Graduate Studies Committee within two semesters after passing Qualifier II and absolutely prior to submitting the Application for Candidacy form.

3. Candidacy Examination: After completion of all required courses (as specified by the student's PhD Candidacy Examination Committee), the candidate's PhD Candidacy Examination Committee will administer and grade a PhD Candidacy Examination. The examination consists of two parts. A written portion covers material on some area in the statistical literature as agreed upon by the student and the Examination Committee. This portion will be administered within two years of the student's passing Qualifier II and will discuss open research topics in this area and possible research methodology for solving these problems. This portion will ordinarily be a thesis proposal, but the student is not obliged to follow through with a thesis in this area, and the examination need not be repeated if the thesis topic is changed at a later date. After the Examination Committee accepts the written portion, they will administer a two-hour oral examination over this material. The student has two weeks to complete the written portion of the exam. The oral exam is scheduled at least two weeks after the due date for the written portion of the exam. The student must submit an Application for Candidacy form to the Graduate School via GRADFORMS.OSU.EDU at least two weeks before the proposed date of the oral portion of the candidacy exam.

4. Final Oral Examination/Dissertation Defense: After passing the Candidacy Exam, the student should form a Dissertation Committee. The dissertation committee is composed of the advisor who must be a Category P Graduate Faculty member in the student's graduate program and at least two other authorized Graduate Faculty members. Once the student has made sufficient progress (as judged by the PhD Dissertation Committee) on his/her PhD dissertation to warrant holding the Final Oral Examination, the student will schedule the Final Examination. Before a defense can be held, the student must submit a complete, word-processed dissertation draft to the dissertation committee for review and approval or disapproval. The student must also submit the online Application for Final Examination form via GRADFORMS.OSU.EDU at least two weeks prior to the actual Final Oral Examination/Dissertation Defense date. The PhD Dissertation Committee then conducts a two-hour oral examination in which the candidate discusses/defends his/her thesis. Finally, the student must also submit the online Graduate School Application to Graduate form via GRADFORMS.OSU.EDU by the published deadline of the Graduate School (the third Friday of the term of intended graduation). Please consult the Graduate School website for details.

Note: Any student who began the program under quarters should consult with the Graduate Studies Chair.

INTERDISCIPLINARY PHD PROGRAM IN BIOSTATISTICS

The basic philosophy of the Interdisciplinary PhD program in Biostatistics is to provide educated and trained personnel to the academic biostatistics community, including academia, industry, and government. The goal is to develop a student's ability to create new methodologies as well as address applied questions that arise from the biomedical sciences and public health.

The Interdisciplinary PhD program in Biostatistics is a joint venture between The Ohio State University Department of Statistics and the Division of Biostatistics in the College of Public Health. Students in this program choose between one of two specializations: Methodology and Public Health. Both specializations require a core curriculum in theoretical and applied statistics; the Methodology specialization has a particular emphasis on biomedical sciences applications, while the Public Health specialization has a particular emphasis on public health applications.

Complete information about advising, the program requirements, suggested plan of study, and associated forms is at http://biostatprograms.osu.edu/.

All students are expected to be familiar with the Graduate School Handbook as all graduate students are subject to the policies set forth by the OSU Graduate School.

GRADUATE MINOR IN STATISTICAL DATA ANALYSIS PROGRAM

Prerequisites: High school-level algebra

Course Requirements

A grade of B or better or S in each course comprising the graduate minor is required per Section 8.4 of the Graduate School Handbook.

Required	5301 (4)	Intermediate Data Analysis I
	5302 (3)	Intermediate Data Analysis II
Electives (5 hours)	At least **5 additional credit hours** at the 6000-level (from among courses in Group A). Courses at the 6000-level from Group B or courses at a higher level can be substituted as an alternative with appropriate permission.	
Group A Electives	6510 (3)	Survey Sampling Methods
	6610 (3)	Applied Nonparametric Statistics
	6620 (2)	Environmental Statistics
	6640 (3)	Principles of Statistical Quality Control
	6650 (2)	Discrete Data Analysis
	6615 (2)	Design and Analysis of Clinical Trials
Group B Electives (permission required to use these toward minor requirements)	6520 (3)	Applied Statistical Analysis with Missing Data
	6530 (2)	Introduction to Spatial Statistics
	6540 (3)	Applied Stochastic Processes
	6550 (2)	Statistical Analysis of Time Series
	6560 (3)	Applied Multivariate Analysis
	6570 (2)	Applied Bayesian Analysis
	6605 (3)	Applied Survival Analysis
	6690 (1-5)	Graduate Topics in Statistics

Sample Graduate Minor in Statistical Data Analysis Program

	Autumn	Spring
Year 1	5301	5302
Year 2	Elective	Elective

Note: Any student who began the minor program under quarters should contact the Graduate Minor Advisor.

GRADUATE MINOR IN STATISTICS PROGRAM

Prerequisites: College-level Linear Algebra (Math 2568.01) and Calculus (Math 2153.XX)

Course Requirements

A grade of B or better or S in each course comprising the graduate minor is required per Section 8.4 of the Graduate School Handbook.

Required	6201 (4)	Introduction to Probability and Mathematical Statistics
	6410 (4)	Design and Analysis of Experiments
	6450 (4)	Applied Regression Analysis
Electives (2 hours)	At least **2 additional credit hours** at the 6000-level from among the courses listed below. Higher level courses can be substituted as an alternative with appropriate permission.	
Approved Electives	6510 (3)	Survey Sampling Methods
	6520 (3)	Applied Statistical Analysis with Missing Data
	6530 (2)	Introduction to Spatial Statistics
	6540 (3)	Applied Stochastic Processes
	6550 (2)	Statistical Analysis of Time Series
	6560 (3)	Applied Multivariate Analysis
	6570 (2)	Applied Bayesian Analysis
	6605 (3)	Applied Survival Analysis
	6610 (3)	Applied Nonparametric Statistics
	6615 (2)	Design and Analysis of Clinical Trials
	6620 (2)	Environmental Statistics
	6640 (3)	Principles of Statistical Quality Control
	6650 (2)	Discrete Data Analysis
	6690 (1-5)	Graduate topics in Statistics
	6730 (2)	Introduction to Computational Statistics

Sample Graduate Minor in Statistics Program

	Autumn	Spring
Year 1	6201	6410
Year 2	6450	Elective

Note: Any student who began the minor program under quarters should contact the Graduate Minor Advisor.