BIOMETRY, M.S.

Biometry is the development and application of statistical methods to biological problems. At the University of Wisconsin, biometry refers to this application to problems from plant, animal and agricultural biology. (Biostatistics denotes this application to human biology.) The biometry program is an M.S. degree program in the field of biometry.

The program is interdisciplinary, providing formal course work in statistics and biology, consulting experience, and supervised research combining the two areas. Students completing the program will understand biological processes and have the ability to apply and extend a broad range of statistical concepts and techniques to biological problems. This integration of statistics and biology is the distinguishing feature of the program. The biometry program is distinct from the M.S. statistics program in its interdisciplinary emphasis and corresponding reduced depth in statistics. (Students interested in training with statistical consulting as the primary focus should apply for the M.S. in statistics through the statistics department.)

The biometry program is intended for two groups of students:

1. students simultaneously working toward or intending to work toward a Ph.D. in a biological discipline and
2. non-Ph.D. students.

Students who complete the M.S. in Biometry and the Ph.D. in a biological science should be at the forefront of quantitative biological research. Students who stop with the M.S. in Biometry, possibly obtaining another M.S. in a biological science concurrently, will be well suited for positions with industry or government focused on quantitative biological research.

ADMISSIONS

Prospective students may apply for admission to the biometry program without application to any other program. Prospective students may also apply simultaneously with application to another program or after admission into another program. It is anticipated that most students enrolled in the biometry program will be enrolled concurrently in another program.

Acceptance of a prospective student by a statistical and biological co-advisor, who should be identified at the time of application, is necessary for admission into the Program and input from prospective co-advisors will be sought in the admissions process. It is expected that most students will be supported through a biological department or program or with their own funds. Opportunity for financial support through the program is extremely limited.

Applicants to the M.S. program should have completed the following prerequisites:

1. undergraduate calculus (MATH 221 Calculus and Analytic Geometry 1, MATH 222 Calculus and Analytic Geometry 2, and MATH 234 Calculus–Functions of Several Variables or equivalent);
2. a course in statistics (HORT/F&W ECOL/STAT 571 Statistical Methods for Bioscience I and STAT/F&W ECOL/HORT 572 Statistical Methods for Bioscience II or equivalent one year sequence);
3. background courses in biology (e.g., BOTANY/BIOLOGY 130 General Botany, ZOOLOGY/BIOLOGY 101 Animal Biology & ZOOLOGY/BIOLOGY 102 Animal Biology Laboratory, BIOLOGY/BOTANY/ZOOLOGY 151 Introductory Biology & BIOLOGY/BOTANY/ZOOLOGY 152 Introductory Biology).

The background courses in biology are a bare minimum; it is anticipated that almost all successful applicants will have a strong background in some area of biological science. Under extenuating circumstances, students may appeal to the Biometry Executive Committee for exemptions to prerequisites or requirements.

GRADUATE SCHOOL ADMISSIONS

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
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<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</table>

Mode of Instruction Definitions

**Evening/Weekend:** These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

**Online:** These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

**Hybrid:** These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.
Accelerated: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

**CURRICULAR REQUIREMENTS**

<table>
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<tr>
<th>Minimum Credit Requirement</th>
<th>30 credits</th>
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<table>
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<tr>
<th>Minimum Residence Credit Requirement</th>
<th>16 credits</th>
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<tr>
<th>Graduate Coursework Requirement</th>
<th>At least half of degree coursework (15 credits out of 30 total credits) must be completed in statistics courses numbered 600 or above (which the statistics department considers to be graduate courses).</th>
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<tr>
<th>Overall Graduate GPA Requirement</th>
<th>3.00 GPA required.</th>
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<tr>
<th>Other Grade Requirements</th>
<th>A grade of B or better must be received in any course used to fulfill the required and elective course requirements.</th>
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<tr>
<th>Assessments and Examinations</th>
<th>Candidates must complete a project with an emphasis on the integration of statistics and science. A final oral examination is also required upon completion of the coursework and project.</th>
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<tr>
<th>Language Requirements</th>
<th>No language requirements.</th>
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</thead>
</table>

**REQUIRED COURSES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro Math Stat, completed using one of the following sequences:</td>
<td></td>
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</table>

| STAT/MATH 309 & STAT/MATH 310 | Introduction to Probability and Mathematical Statistics I and Introduction to Probability and Mathematical Statistics II | 6 |

| STAT 311 & STAT 312 | Introduction to Theory and Methods of Mathematical Statistics I and Introduction to Theory and Methods of Mathematical Statistics II | 6 |

Or equivalent one-year sequence

<table>
<thead>
<tr>
<th>Statistics 600+</th>
<th>Students choose graduate-level courses numbered above 600.¹</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistics 500+</td>
<td>Students choose graduate-level courses numbered above 500.²</td>
<td>3</td>
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<tr>
<th>Biological³</th>
<th>Consulting Experience</th>
</tr>
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| STAT 699 | Directed Study ⁴ | 3 |
| Research ⁵ | 3 |

| Total Credits | 30 |

¹ Excluding STAT/B M I 641 Statistical Methods for Clinical Trials, STAT 698 Directed Study, STAT 699 Directed Study, and STAT 990 Research.
² Excluding STAT/F&W ECOL/HORT 571 Statistical Methods for Bioscience I, STAT/F&W ECOL/HORT 572 Statistical Methods for Bioscience II, STAT 698 Directed Study, and STAT 990 Research. Credits from suitable quantitative courses taught in other (non-biological) departments (e.g., mathematics) may be substituted.
³ Excluding introductory statistics courses and research. Other criteria are that at least six credits are taken in a single discipline or in closely related disciplines, at least six credits are taken at the 700 level and above or in courses specifically designated as graduate courses, and a maximum of three credits are obtained in statistically oriented courses (e.g., AGRONOMY/HORT 811 Biometrical Procedures in Plant Breeding).
⁴ Students must complete 3 credits of STAT 699 Directed Study by consulting in the CALS Statistical Consulting Service. (These credits cannot be used for meeting requirements in section C.) This consists of supervised consulting and will provide exposure to statistical issues surrounding a broad range of problems in biology, provide awareness of practical issues such as experiment management, data collection, data recording, etc., and provide experience assisting others in designing experiments and analyzing data. One credit is roughly equivalent to a single project that can be completed in one semester, and involves about 20–30 hours of effort, including meetings with consulting clients, background research, data analyses, etc.
⁵ Each student must complete a project that represents an original contribution to biometry. Examples of such contributions may include a novel analysis of some interesting biological data, the creation and evaluation of a useful experimental design, or the development and/or comparison of statistical methods. The project results are to be presented in a manuscript with emphasis on the integration of statistics and science. The manuscript should be of a quality that can lead to a publication. This requirement will be formalized by enrolling in at least three credits of “Research” (e.g., HORT 990 Research) in the department of one of the co-advisors. (These credits cannot be used for meeting other requirements.) For a student seeking a double M.S., a joint thesis would satisfy this requirement.

**GRADUATE SCHOOL POLICIES**

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**MAJOR-SPECIFIC POLICIES**

**GRADUATE PROGRAM HANDBOOK**

The Graduate Program Handbook (http://www.stat.wisc.edu/sites/default/files/2016-17%20Complete%20PDF%20Handbook.pdf) is the repository for all of the program's policies and requirements.

Prior Coursework
**Graduate Work from Other Institutions**
With program approval, students are allowed to count no more than 9 credits of graduate coursework from other institutions towards the graduate degree credit and graduate coursework (50%) requirements. Coursework earned five or more years prior to admission to the master’s degree is not allowed to satisfy requirements.

**UW–Madison Undergraduate**
No credits from a UW–Madison undergraduate degree are allowed to count toward the degree.

**UW–Madison University Special**
No credits earned while a UW–Madison University Special student are allowed to count toward the degree.

**PROBATION**
Candidates who fail to meet satisfactory progress criteria in two consecutive reviews will be dropped from the program.

**ADVISOR / COMMITTEE**
Students are required to meet with their advisor near the beginning of each semester to discuss course selection and progress.

**CREDITS PER TERM ALLOWED**
15 credits

**TIME CONSTRAINTS**
If the student is enrolled in a concurrent Ph.D. degree, the student should make application for both the master’s and Ph.D. degrees during the semester in which they defend. In other words, the biometry degree should be completed by the semester in which the concurrent Ph.D. degree is completed. It is expected that all enrolled students will complete the program within three years.

**OTHER**
The biometry program is distinct from the M.S. statistics program in its interdisciplinary emphasis and corresponding reduced depth in statistics. (Students interested in training with statistical consulting as the primary focus should apply for the M.S. in statistics through the statistics department.) The program is intended for two groups of students: (1) students simultaneously working towards or intending to work towards a Ph.D. in some biological discipline, and (2) non-Ph.D. students.

**PROFESSIONAL DEVELOPMENT**

**GRADUATE SCHOOL RESOURCES**
Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

**LEARNING OUTCOMES**

1. Demonstrates understanding and critical evaluation of statistical methods selected for applications in scientific inquiries.

2. Identifies data sources and study design, and assembles appropriate statistical approaches to data analysis, in a particular scientific field of study.

3. Evaluates and synthesizes data information pertaining to questions in the field of study.

4. Communicates data concepts and analysis results clearly.

5. Recognizes and applies principles of ethical and professional conduct.

**PEOPLE**

**Faculty:** Professors Clayton (Statistics/Plant Pathology), Ané (Statistics/Botany), Yandell (Statistics/Horticulture), Zhu (Statistics/Entomology)