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

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website. Graduate admissions is a two-step process between academic programs and the Graduate School. Applicants must meet the minimum requirements (https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).

Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>March 15</td>
</tr>
<tr>
<td>Spring Deadline</td>
<td>November 1</td>
</tr>
<tr>
<td>Summer Deadline</td>
<td>The program does not admit in the summer.</td>
</tr>
<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Required.</td>
</tr>
<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a>).</td>
</tr>
<tr>
<td>Other Test(s) (e.g., GMAT, MCAT)</td>
<td>n/a</td>
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</tbody>
</table>

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.

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 restrictions 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>Mode of Instruction</th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</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>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>30 credits</td>
</tr>
<tr>
<td>Credit</td>
<td>Requirement</td>
</tr>
<tr>
<td>Minimum</td>
<td>16 credits</td>
</tr>
<tr>
<td>Residence</td>
<td>Credit Requirement</td>
</tr>
<tr>
<td>Minimum</td>
<td>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).</td>
</tr>
<tr>
<td>Overall</td>
<td>3.00 GPA required.</td>
</tr>
<tr>
<td>Graduate GPA</td>
<td>Requirement</td>
</tr>
<tr>
<td>Other Grade</td>
<td>A grade of B or better must be received in any course used to fulfill the required and elective course requirements.</td>
</tr>
<tr>
<td>Assessments</td>
<td>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.</td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>No language requirements.</td>
</tr>
<tr>
<td>Requirements</td>
<td></td>
</tr>
</tbody>
</table>

REQUIRED COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intro Math Stat, completed using one of the following sequences:</td>
<td>6</td>
</tr>
</tbody>
</table>

**Biostatistics**

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

| MATH 310   | Introduction to Probability and Mathematical Statistics I & II |
| 310        |                                                                 |

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

Or equivalent one-year sequence

**Statistics 600+**

Students choose graduate-level courses numbered above 600. 1

**Statistics 500+**

Students choose graduate-level courses numbered above 500. 2

**Biological Consulting Experience**

| STAT 699   | Directed Study 4 |
| 309        | 3                  |

Research 5

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., AGROMEY/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 resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
- Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Dean of Students Office (https://doso.students.wisc.edu/) (for all students to seek grievance assistance and support)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

**College of Agricultural and Life Sciences: Grievance Policy**

In the College of Agricultural and Life Sciences (CALS), any student who feels unfairly treated by a member of the CALS faculty or staff has the right to complain about the treatment and to receive a prompt hearing. Some complaints may arise from misunderstandings or communication breakdowns and be easily resolved; others may require formal action. Complaints may concern any matter of perceived unfairness.

To ensure a prompt and fair hearing of any complaint, and to protect the rights of both the person complaining and the person at whom the complaint is directed, the following procedures are used in the College of Agricultural and Life Sciences. Any student, undergraduate or graduate, may use these procedures, except employees whose complaints are covered under other campus policies.

1. The student should first talk with the person at whom the complaint is directed. Most issues can be settled at this level. Others may be resolved by established departmental procedures.
2. If the student is unsatisfied, and the complaint involves any unit outside CALS, the student should seek the advice of the dean or director of that unit to determine how to proceed.
   a. If the complaint involves an academic department in CALS the student should proceed in accordance with item 3 below.
   b. If the grievance involves a unit in CALS that is not an academic department, the student should proceed in accordance with item 4 below.
3. The student should contact the department's grievance advisor within 120 calendar days of the alleged unfair treatment. The departmental administrator can provide this person's name. The grievance advisor will attempt to resolve the problem informally within 10 working days of receiving the complaint, in discussions with the student and the person at whom the complaint is directed.
   a. If informal mediation fails, the student can submit the grievance in writing to the grievance advisor within 10 working days of the date the student is informed of the failure of the mediation
attempt by the grievance advisor. The grievance advisor will provide a copy to the person at whom the grievance is directed.
b. The grievance advisor will refer the complaint to a department committee that will obtain a written response from the person at whom the complaint is directed, providing a copy to the student. Either party may request a hearing before the committee. The grievance advisor will provide both parties a written decision within 20 working days from the date of receipt of the written complaint.
c. If the grievance involves the department chairperson, the grievance advisor or a member of the grievance committee, these persons may not participate in the review.
d. If not satisfied with departmental action, either party has 10 working days from the date of notification of the departmental action to file a written appeal to the CALS Equity and Diversity Committee. A subcommittee of this committee will make a preliminary judgement as to whether the case merits further investigation and review. If the subcommittee unanimously determines that the case does not merit further investigation and review, its decision is final. If one or more members of the subcommittee determine that the case does merit further investigation and review, the subcommittee will investigate and seek to resolve the dispute through mediation. If this mediation attempt fails, the subcommittee will bring the case to the full committee. The committee may seek additional information from the parties or hold a hearing. The committee will present a written recommendation to the dean who will provide a final decision within 20 working days of receipt of the committee recommendation.

4. If the alleged unfair treatment occurs in a CALS unit that is not an academic department, the student should, within 120 calendar days of the alleged incident, take his/her grievance directly to the Associate Dean of Academic Affairs. The dean will attempt to resolve the problem informally within 10 working days of receiving the complaint. If this mediation attempt does not succeed the student may file a written complaint with the dean who will refer it to the CALS Equity and Diversity Committee. The committee will seek a written response from the person at whom the complaint is directed, subsequently following other steps delineated in item 3d above.

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.

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)

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.