Program Policy Statement – M.S. in Applied Statistics

Part I. Program History

A. Statement of purpose and expectation of graduate study in the program.

The Statistics Program moved from the Department of Mathematical Science to the Department of Food and Resource Economics, College of Agriculture and Natural Resource in Fall, 1999. Following that we established the M.S. in Statistics which provides a balance of a foundation in theoretical statistics, applied coursework in statistical techniques, and opportunities for application of statistical knowledge through the StatLab and internships with local companies.

Since the beginning of the M.S. in Statistics at the University of Delaware there has been an explosion in the demand for trained statisticians. This has resulted in an increase in M.S. degrees in the U.S., and the Statistics Program at the University of Delaware has participated in this growth. We now feel it is time to add a M.S. in Applied Statistics that is presented online. The M.S. in Applied will have some similarities with our regular M.S. but it will trade off depth in statistical theory with more hands-on applications and model building using a case study approach. The "applied" aspect of our program will be focused on using real data and making real decisions in analysis.

Students completing the M.S. degree in Applied Statistics will:

1. Have a theoretical foundation in probability and mathematical statistics.
2. Have applied applications in regression; design of experiments; logistic regression and models of counts; and multivariate methods. There will be options for additional applied applications.
3. Have exposure to various software including SAS, JMP, and R.
4. Have the ability to analyze a variety of data and apply appropriate techniques based on the type of data and the objectives of the research through case study applications in the courses.
5. Have an opportunity to apply the course work in an applied research project designed by the student in conjunction with an advisor.

B. Date of Permanent Status (or current status).

The M.S. in Applied Statistics is scheduled to start in Fall, 2017.

C. Degrees offered (include brief description of concentrations, fields, etc.).

M.S. In Applied Statistics

Part II. Admission

A. Admission Requirements (be specific about GRE, GMAT, and TOEFL Scores, G.P.A and others).

On a 4.0 system, applicants should have a G.P.A. of at least 2.5 and an average of at least 3.0 in mathematics, business, economics, or related areas. This degree will consider applicants from a variety of fields.
Applicants who have completed an advanced degree (M.S. or Ph.D.) must have done so with a G.P.A. of at least 3.0.
Applicants must take the GRE Aptitude Test with at least a score of 1050 in quantitative math and verbal (with an emphasis on the quantitative) for the traditional test. Students taking the new GRE exam should have a minimum of 300 combined on verbal and quantitative reasoning.
Students for whom English is not their first language must meet a minimum of 85 on the TOEFL IBT examination.

Admission to the Statistics Program is based on selections made by the department graduate committee in compliance with University policies and procedures. Admission is selective and competitive based on the number of well-qualified applicants and the limits of available faculty and facilities. Those who meet stated minimum academic requirements are not guaranteed admission, nor are those who fail to meet those requirements necessarily precluded from admission if they offer other appropriate strengths. We encourage people who are working in a field where analytics are important to apply to the M.S. in Applied Statistics and to share their experiences and goals.

B. Prior degree requirements.
Candidates for admission to the statistics program need not have majored in any specific undergraduate field as a prerequisite for admission. However, competence is expected in basic statistics, linear algebra, advanced calculus, and experience with computer programming.

C. Application deadlines for the M.S. in Applied Statistics.
Applications will be taken on a continuing basis to allow for admittance in either the Fall, Spring, or Summer Semesters. The deadlines for each semester are given below.
Fall: August 1
Spring: December 1
Summer: May 1

D. Special competencies needed (i.e., specific courses or experience). n/a

E. Admission categories (explain other than regular such as provisional).

1. REGULAR STATUS: is offered to students who meet all of the established entrance requirements. Individuals who apply during the final year of undergraduate or current graduate work and are unable to supply transcripts showing the conferral of the degree will be admitted pending the conferral of the degree. Evidence of the earned degree must be provided prior to the first day of classes in the term of admission.

2. CONDITIONAL ADMISSION: is offered when transcripts or test scores must still be verified by the Office of Graduate and Professional Education. The conditions of acceptance must be satisfied within the first semester of coursework.
3. PROVISIONAL ADMISSION: is offered to students who are seeking admission to a degree program but lack specific prerequisites needed in the major department. Students may need to get a basic course in statistics (such as STAT608) or advanced work in mathematics for calculus and/or linear algebra.
4. NONDEGREE ADMISSION: may be offered to students who apply too late to submit standardized test scores but have supplied an official transcript. Test scores must be submitted and accepted by the department by the end of the first semester to be eligible to continue in a degree program.
   Nondegree status is also offered to students who wish to work to earn graduate credit with graduate status but do not intend to work for a degree (e.g., certificate programs). Transcripts and GRE scores are required for admission.

F. Other documents required (i.e., letters of recommendation, essays, portfolios, interviews, writing assessments, etc.).
Transcripts, letters of recommendation, essays, resume. We will review the essay part of the application carefully. We want to know why you are interested in applying to this program and how this degree will make sense in your overall career path.

G. Must include University statement: Admission to the graduate program is competitive. Those who meet stated requirements are not guaranteed admission, nor are those who fail to meet all of those requirements necessarily precluded from admission if they offer other appropriate strengths.

Part III. Academic

A. Degree Requirements
The total credits required for the degree are 30.
15 credits of core and 15 credits of electives:

Applied Statistics M.S. Core requirements (15 credits)

- STAT 670 Intro to Stat Analysis I – Probability (3 credits)
- STAT 671 Intro to Stat Analysis II – Mathematical Statistics (3 credits)
- STAT 611 Regression Analysis (3 credits)
- STAT 613 Applied Multivariate Methods (3 credits)
- STAT 615 Design and Analysis of Experiments I (3 credits)

Applied Statistics M.S. Electives (15 credits)

- STAT 674 Applied Data Base Management (3 credits)
- STAT 675 Logistic Regression (3 credits)
- STAT 656 Biostatistics (3 credits)

- STAT 620 Nonparametrics (3 credits)
- STAT 621 Survival Analysis (3 credits)
- STAT 635 Statistical Quality Control (3 credits)
- STAT 666 Independent Studies (up to three 1-credit courses in different topics for a total of up to 3 credits)
- STAT 668 Research project (3 credits)

A student may request additional coursework be counted from a previous degree or from another institution and department. Partitions are presented to the Chair who renders a decision after consultation with the Graduate Committee and relevant faculty. A minimum GPA of 3.0 is required for this program.

The following Non-STAT Major Courses do not apply to the Applied Statistics M.S. degree. We may require one or both of these courses for applicants who do not have sufficient background in statistics as a way to prepare them for the degree. However, these courses will not count towards the 30 credits required for the program.
STAT 608 - Statistical Research Methods
STAT 609 - Regression and Experimental Design

B. Committees for exams or thesis
New students will be assigned an advisor. The student has the responsibility to meet with their advisor to plan their course of study in the program. Advice will be given concerning course selection based on interests and undergraduate/graduate background. Our program is sufficiently small that we are able to give individualized attention to graduate students. There is no thesis option in this program, but there will be an option for research credits and a research project.

C. Timetable and definition of satisfactory progress towards the degree
An online degree geared toward applicants who are working has to provide a certain degree of flexibility in course progress. The M.S. in Applied Statistics will offer summer courses, though we do not recommend students enrolling in more than 2 courses in summer. Students can take 3 to 10 credits a semester depending upon their own workload. It is possible to complete this major in an Accelerated Full-Time mode (three semesters plus summer); Full-Time (4 semesters); or Part-Time (up to 3 years). Regardless, it is important to monitor progress and make sure progress is being made in gaining the degree. Grade requirements (general and specific): A minimum GPA of 3.0 is required to remain in good standing.

The following is a recommended sequence of courses for the students in the major depending upon their time-line to complete.

Recommended Sequence of Courses Based on the Time-frame of the student.

<table>
<tr><td colspan="2">Accelerated Full-Time – 3 semesters plus summer</td></tr>
<tr><td>Fall Year 1
STAT 670 Intro to Stat Analysis I – Probability (3 credits)
STAT 611 Regression Analysis (3 credits)
Elective</td><td>Spring Year 1
STAT 671 Intro to Stat Analysis II – Mathematical Statistics (3 credits)
STAT 615 Design & Analysis of Experiments I (3 credits)
Elective</td></tr>
<tr><td>Summer Year 1
Elective
Elective</td><td>Fall Year 2
STAT 613 Applied Multivariate Methods (3 credits)
Elective</td></tr>
<tr><td colspan="2">Full-Time – 4 semesters</td></tr>
<tr><td>Fall Year 1
STAT 670 Intro to Stat Analysis I – Probability (3 credits)
STAT 611 Regression Analysis (3 credits)
Elective</td><td>Spring Year 1
STAT 671 Intro to Stat Analysis II – Mathematical Statistics (3 credits)
STAT 615 Design and Analysis of Experiments I (3 credits)
Elective</td></tr>
<tr><td>Fall Year 2
STAT 613 Applied Multivariate Methods (3 credits)
Elective</td><td>Spring Year 2
Elective
Elective</td></tr>
<tr><td colspan="2">Part-Time - It is possible to finish this degree by taking 2 course in only 1 semester and 1 course in all other semesters and summers.</td></tr>
<tr><td colspan="2">The sequence of core courses is the following;
1. STAT 670 Intro to Stat Analysis I – Probability (3 credits)
2. STAT 671 Intro to Stat Analysis II – Mathematical Statistics (3 credits)
3. STAT 613 Applied Multivariate Methods (3 credits)

There is no sequence for electives other than we would not approve STAT668 until a student completes two semesters of coursework (18 credits).</td></tr>
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Academic Good Standing

To be considered in good academic standing, a student must maintain a minimum cumulative graduate grade point average (GPA) of 3.00 on a 4.00 scale each semester. To be eligible for an advanced degree, a student's cumulative grade point average shall be at least a 3.00 and the student's grades in courses counted toward the degree requirements of the program shall equal at least a 3.00. A grade below a C- will not be counted toward the course requirements for a degree but is calculated in the student's cumulative grade point average.

In addition to the University's definition of good standing, some programs may also require minimum grades in specific courses in the program. These courses are identified in each program's policy and procedures manual and these unit-specific requirements have been approved by the Faculty Senate.

Academic Deficiency And Probation

The Office of Graduate and Professional Education monitors the academic progress of all graduate students and notifies students in writing of all academic deficiencies. The cumulative GPA after each 9-hour increment determines academic standing. (See chart below.)

Any status (or clear) 3.0 or above Clear
Clear 2.99-2.5 Warning
Clear 2.49-2.0 Probation
Probation Below 3.0 Dismissal
Warning Below 3.0 Probation
Any status Below 2.0 Dismissal

In addition to the University policy regarding minimum grade point averages, some departments require graduate students to maintain certain performance minima in their programs of study in all or in particular courses. Failure to meet the stated minima may lead to academic dismissal from the program.

Graduate Studies Academic Probation Policy

The University's Academic Probation Policy is expressed in the following:

The Office of Graduate and Professional Education notifies students when they are dismissed from graduate programs without completing a degree. Dismissals usually take place at the end of a term. Students may be dismissed for the following reasons:

- Upon the expiration of the five-year time limit for master's degree programs or for those students in a doctoral program who were admitted with a master's degree. Upon the expiration of the seven-year time limit for doctoral students who were admitted without a master's degree.

- Upon the failure to meet the grade point average requirements as stated in the policy on Academic Deficiency and Probation.

- Upon written notice to the Office of Graduate and Professional Education of voluntary withdrawal from the program.

- Upon failure to pass the preliminary, language, or comprehensive/candidacy examination(s), a thesis/executive position paper proposal defense, or a thesis/executive position paper defense.

- Upon the failure to achieve a cumulative grade point average of 3.0 upon the completion of the stated number of required credits for a degree.

- Upon the failure to meet the stated minima in specific course requirements as identified by individual programs when a department has a policy that such failure leads to dismissal from the program.

- Upon failure to satisfactorily conduct research required for the degree.

Upon the determination by the faculty of the student's department that the student has failed to meet or has failed to make satisfactory progress towards meeting academic standards required of the student's program other than the failure to achieve a cumulative grade point average of 3.0 upon the completion of the stated number of required credits for a degree.

At the close of each semester, winter session or summer session, in those circumstances deemed appropriate by the department or program faculty exercising its professional judgment, the faculty of each department or program may evaluate the progress of a graduate student toward meeting the academic standards of the program in which the student is enrolled. In addition to graded course work, academic standards include, but are not limited to, professional, ethical, clinical and other standards required of graduate students.

Students are entitled to know the procedures and standards by which their academic performance is assessed. Each program has a statement of policies and procedures by which student academic progress is monitored and by which comprehensive, qualifying, and final examinations/defenses are conducted and graded. If, in the professional judgment of a department or program faculty, a student has failed to make satisfactory progress toward meeting the academic standards of the program in which that student is enrolled, the faculty may vote to dismiss that student from the program.

In the case of dismissal, the program director is required to send a report to the Office of Graduate and Professional Education that states the faculty vote on the decision causing dismissal and the justification for this action. The Office of Graduate and Professional Education will notify a student in writing when the student is being dismissed for failure to make satisfactory progress in the program.

In the case of academic dismissal, the student may appeal the termination by writing to the Office of Graduate and Professional Education. This appeal must be made within ten class days from the date on which the student has been notified of academic dismissal. If the Vice Provost grants reinstatement, the student must meet the conditions of the reinstatement. Failure to meet these conditions will result in dismissal from the program. A graduate student may be reinstated only once to a given major. The student's academic transcript will reflect the reinstatement with academic probation status.

Academic Progress

GPA Requirements

Students must have a minimum overall cumulative grade point average of 3.0 to be eligible for the degree. In addition, the grades in courses specifically required for the degree program must average at least 3.0. All graduate-numbered courses taken with graduate student classification at the University of Delaware are applied to the cumulative index. Credit hours and courses for which the grade is below "C-" do not count toward the degree even though the grade is applied to the index.

Academic Probation

The Office of Graduate Studies monitors the academic progress of all graduate students and notifies students in writing of all academic deficiencies. The cumulative GPA after each 9-hour increment determines academic standing. In addition to the University policy regarding minimum grade point averages, some departments require graduate students to maintain certain performance minima in their programs of study in all or in particular courses. Failure to meet the stated minima may lead to academic dismissal from the program.

Satisfactory Progress toward a Graduate Degree

If a graduate student fails to make satisfactory progress toward all degree requirements, permission may be denied to continue in the degree program. At the close of each semester, winter session or summer session, in those circumstances deemed appropriate by the department or program faculty exercising its professional judgment, the faculty of each department or program may evaluate the progress of a graduate student toward meeting the academic standards of the program in which the student is enrolled. In addition to graded course work, academic standards include, but are not limited to, professional, ethical, clinical and other standards required of graduate students. In the case of dismissal, the program director is required to send a report to the Office of Graduate and Professional Education that states the faculty vote on the decision causing dismissal and the justification for this action. The Office of Graduate and Professional Education will notify a student in writing when the student is being dismissed for failure to make satisfactory progress in the program and the procedures for the student to appeal the action.

Time Limits for the Degrees

Time limits for the completion of degree requirements begin with the date of matriculation and are specifically expressed in the student's letter of admission. The University time limit is ten consecutive semesters to complete the degree requirements for students entering a master's degree program. Students completing the requirements for the master's degree who are subsequently granted permission to continue toward the doctoral degree are given an additional ten consecutive semesters. Students entering a doctoral program with a master's degree are given ten consecutive semesters to complete the requirements. Students entering a

doctoral program without a master's degree are given fourteen consecutive semesters to complete the requirements. Students who change their degree plan and have transferred from one degree program to another degree program are given ten consecutive semesters from the beginning of the first year in the latest program.

Extension of the Time Limit

Requests for time extensions must be made in writing and approved by the student's advisory committee and the chair of the department's graduate committee. The department will forward the request to the Office of Graduate and Professional Education. The Office will determine the student's eligibility for a time extension and will notify the student in writing of its decision to grant an extension of time.

Part IV. Assessment Plan

Assessment plan for M.S. in Applied Statistics				
Objectives	**Strategic Activities**	**Measures**	**Short-term Outcomes**	**Long-term Impact**
1. Train students in theoretical statistics	Recruit excellent applicants and matriculate students with credentials similar to those in the existing departmental graduate programs	Number and demographic data of student applicants and matriculated students.	Retention and time to degree statistics	Students gain employment in statistical related fields
	Course work covering the disciplines of probability, and mathematical statistics	Faculty evaluation of student progress in course work Surveys of graduate students in the program and post-graduation	Students are prepared for subsequent coursework that requires the theoretical knowledge	Graduates enjoy long term success in statistical careers.
2. Provide training in applied statistical techniques	Course work in regression, design of experiments, multivariate analysis, logistic regression, data management, and other approved courses	Surveys of students focusing on their experiences in these classes Surveys of graduates to determine the utility of these classes to their career Faculty evaluation of student progress in course work	Course work for the M.S. Applied Statistics degree helped students secure initial employment Students and graduates report applying knowledge from courses to work settings	Graduates enjoy long term success in statistical careers
3. Provide experiential training in statistical internships to prepare students for the expectations of the workplace	Case study approach in courses with real data and required analysis Research Project	Quality of the case study results in the courses. Faculty evaluation of quality and scope of the research project. Surveys of graduates to determine the utility of their course experience to their career	Case studies and the research project forces the student to apply the material in the class to real data.	Graduates enjoy long term success in statistical careers

Part V. Financial aid

A. Financial Awards

There are no financial awards for this degree. There is a discount on the tuition for the online degree that is approximately 40% compared with the Current M.S. in Statistics.

Part VI. Departmental Operations

A. General student responsibilities

Up-to-date addresses, etc.
Department of Applied Economics and Statistics
213 Townsend Hall
Newark, DE 19716
Phone: 302-831-2511
Fax: 302-831-6243

Laboratories and research equipment. None

Hazardous Chemical Information Act.

Vehicles. No department vehicles are provided.

Keys, offices, mail, telephone, copy machine, computer terminals, etc.
All graduate students in the Agricultural and Resource Economics Program are given keys to the graduate office; are allowed use of the graduate office computers; are allowed access to the department photocopy machine (a limited monthly copy allotment is granted all graduate students); are allowed access to the department fax machine; and can access department supplies for such things as paper, pens, notepads and staples.

Access to Student Records

Students wishing to review their Departmental file must submit a written request to the Graduate Program Director at least 24 hours in advance. Students must review the file in the presence of departmental staff or faculty and are not permitted to remove a file from Wolf Hall but may photocopy documents from their folder. All access to student records is in accordance with the Family Educational Rights and Privacy Act.

Standards of Student Conduct

A) Academic honesty

All graduate students are subject to University of Delaware regulations regarding academic honesty.

B) Laboratory Safety and Research Regulations

Graduate students performing laboratory research are subject to all University regulations regarding safety, use of human subjects and animals, and hazardous/radioactive material use and disposal. These guidelines may be found in the University of Delaware Policies and Procedures Manual. Students participating in off campus internship experiences are expected to fully comply will all safety regulations of the workplace.

C) Contact information

It is the responsibility of all students to ensure that their contact information on file with the university is current (mailing address, phone number, email address). It is also the student's responsibility to regularly monitor their email, phone and mail for important notices regarding their enrollment.

D). Departmental facilities

Occasionally student's graduate assistantship or other assignments may require the use of departmental laboratories or other facilities. Keys to laboratories, etc., are maintained in the Department office and will be issued based on faculty and Department Chair approval.

Any assignments that require the expenditure of departmental funds (e.g. data collection activities) require departmental approval in advance and are processed through the department in which the work is to be done.