I. Graduate Program Goals for the Field of Statistics

In the broadest possible terms, the purpose of the graduate program in the Field of Statistics is to prepare its students for a career in Statistical Science, with coverage that is sufficiently deep in its coverage of core principles and methods and sufficiently broad in its coverage of application areas to prepare its students for future employment and success in a diverse array of environments. Specific program goals include the following:

- Attract the best possible graduate students and provide those admitted to the program with the financial and research resources necessary for achieving their educational goals.
- Provide advanced training through coursework and mentored research to help graduate students gain the skills and experience needed to successfully pursue a career as a statistician in academia, government or industry.
- Prepare graduate students for future leadership in research and scholarship, challenging those students to reach the highest possible level of achievement.
- Facilitate completion of graduate degrees in a timely manner.

II. Expected Learning Outcomes

The Field of Statistics offers two doctoral tracks: the M.S./Ph.D. and Ph.D. program. The expected learning outcomes and metrics used for assessment are identical, differing only in the expected time to degree. The Field of Statistics does not offer a separate (i.e., terminal) M.S. program.

Upon completion of the Ph.D. degree, students will have

a. *Demonstrated mastery of statistical theory and methods;*
b. *Achieved breadth and diversity of knowledge through elective coursework and research/ teaching experiences;*
c. *Demonstrated the ability to work collaboratively across disciplines, communicating statistical principles, methods and results to a lay audience;*
d. *Demonstrated a high level of proficiency in oral and written communication skills appropriate for a career in either (i) advanced research and/or teaching at a college or university; or, (ii) advanced research in government and industry;*
e. *Demonstrated the ability to independently conduct, document and defend original research contributions having the potential to advance the field of statistical science.*

III. Methods of Assessment

General proficiencies

The Graduate Committee of the Department of Statistical Science, chaired by the Director of Graduate Studies for the Field of Statistics, will conduct an Annual Progress Review for each student by electronic means in order to keep a regular and accessible record of student progress for the purposes of monitoring academic performance and providing guidance regarding goals and expectations to students each year. Information obtained about courses, progress towards degree requirements, and research and teaching experiences will be used to inform programmatic recommendations for individual students as well as general program enhancement

Key benchmarks:

- Successful completion of all required coursework within the first 2 years of the program (1 year for students admitted directly to the Ph.D. program)
- Successful completion of the A examination within 4 years of program entry (3 years for students admitted directly to the Ph.D. program)
- Successful completion of the B examination and dissertation within 6 years of program entry (4 years for students admitted directly to the Ph.D. program)

The Graduate Field Assistant will collect and collate data on numbers, quality (GRE/GPA), and diversity of all program applicants. These data, as well as time-to-degree and graduation rates, shall also be collected for graduate students that matriculate into the doctoral program. Initial job placement will be tracked for all graduates and published on the website of the Department of Statistical Science. The Graduate Committee will evaluate these numbers every two years and, where necessary, propose recommendations for changes in admissions practices and/or curriculum that must subsequently be ratified by a majority of active Field members.

Expected learning outcomes, measures and success criteria:

a. *Mastery of statistical theory and methods*

   Measure: First Year Evaluation

   Criteria for individual student success: Students must pass this evaluation (see http://www.stat.cornell.edu/phd/examinations.shtml for specific requirements) in order to proceed in the program beyond the end of their second year.

b. *Breadth and diversity of knowledge through elective coursework and research/ teaching experiences*

Measure #1: Second Year Evaluation

Criteria for individual student success: The Graduate Committee for the Department of Statistical Science will conduct a comprehensive evaluation of the entire graduate record of each graduate student during the Spring term of a student's 2nd second year. Students must pass this evaluation (see http://www.stat.cornell.edu/phd/examinations.shtml) in order to proceed in the program beyond the end of their second year.

Measure #2: During a student's A examination, the Special Committee will formulate questions that assess a student's competence in statistical theory, methods and/or practice and use a scoring rubric to assess their knowledge of pertinent background material; assess a student's knowledge of current research directions and, where appropriate, the promise of a student's proposed research agenda and findings to date.

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

Measure #3: During a student's B examination and in evaluating their dissertation, the Special Committee will use a scoring rubric to assess the originality and quality of a student's research; mastery of their chosen research topic and associated ability to articulate the importance of their results and compelling future directions for research; and, their extent of relevant background knowledge and of current research related to their topic.

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

c. *Work collaboratively across disciplines, communicating statistical principles, methods and results to a lay audience*

Measure: Participation and Performance in BTRY 7950: Statistical Consulting

Criteria for individual student success: A grade of Satisfactory in both of the required semesters of consulting, and a rating of Satisfactory or higher from the Director of the Cornell Statistical Consulting Service for walk-in service participation.

d. *A high level of proficiency in oral and written communication skills appropriate for (i) a faculty member at a research university or college; or, (ii) a career in advanced research in either government and industry;*

Each doctoral student has a Special Committee consisting of a minimum of 3 faculty members, the Chair being from the Field of Statistics. The Special Committee will assess oral communication skills as part of the A and B exams and written communication skills as part of the dissertation evaluation.

Measure #1: During a student's A examination, the Special Committee will assess general oral presentation skills, including presentation organization, the ability to convey information in a clear and concise manner, and the ability to articulate answers to questions posed by the Special Committee in a clear and coherent manner.

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

Measure #2: During a student's B examination, the Special Committee will use a scoring rubric to assess general oral presentation skills, including presentation organization, the ability to accurately and concisely convey information, the ability to articulate answers to questions posed by the Committee in a clear and coherent manner, and the ability to articulate novel insight, either in connection with their own work or in answering questions posed by the audience and Special Committee.

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

Measure #3: In evaluating a student's dissertation, the Special Committee will use a scoring rubric to assess general written communication skills, including but not limited to the logical organization of the dissertation and its parts; clarity of presentation; and, general quality of the writing (e.g., grammar, spelling, vocabulary, sentence structure).

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

e. *Independently conduct, document (i.e., via their dissertation, and possibly through publication), and defend original research contributions having the potential to advance the field of statistical science;*

Measure: The Special Committee will use a scoring rubric to assess: the significance and originality of a student's research, as summarized in the introduction to their dissertation and the collective opinion of the Special Committee; the comprehensiveness and coherence of the literature review in motivating the research question(s) considered; the

extent to which creativity and rigorous, defendable reasoning are used in devising solutions to these problems; and, the extent to which the results are properly framed and compelling future research directions have been articulated. Numbers of papers submitted and/or published in peer-reviewed journals and research presentations at national or international conferences that have arisen as a result of dissertation work (i.e., prior to the B exam) will be noted.

Criteria for individual student success: A rating of Proficient, or higher, on all relevant categories on the Field's scoring rubric.

IV. Benchmarks for Success for the Field of Statistics

Typically, the Field of Statistics admits, and graduates, 3-5 students per year. Due to the small numbers of students, benchmarks for success will be computed and assessed based on a four-year running average in order to reduce the influence of inherent random variation in students on the assessment of our program. The goals of the Field of Statistics include an educational program, student mentorship and job placement activities targeted towards meeting or exceeding the following benchmarks:

- At least 90% of MS/PhD students will successfully progress beyond the Second Year Evaluation.
- For MS/PhD and PhD students that progress beyond the Second Year Evaluation
    - 100% of students will achieve a rating of Proficient (3 or higher) on the Field's Scoring Rubric for the A exam and for the B exam/Dissertation in each relevant category.
    - 50% of students will achieve a rating of Exemplary (4 or higher) on the Field's Scoring Rubric for the A exam and for the Bexam/Dissertation in at least two of the following three categories: Breadth & Depth of Disciplinary Knowledge; Critical Thinking; and, Originality in Research.
- Of students that graduate with a PhD and actively seek employment, at least 75% will be successful within 12 months of graduation.

V. Feedback: Use and Dissemination of Assessment Information

The Graduate Committee will collate assessment materials every two years and prepare a written report for consideration by the Field faculty and/or the Graduate School. Elements of the report will include 1) a summary of the goals of the graduate program; 2) the overall level of success that graduate students have achieved in meeting the educational goals of the Field; 3) suggestions for changes in the program, where needed; and, 4) suggestions for changes in the assessment process, where needed.

NOTE: for reasons already explained, full reporting shall commence only after 4 years of data are available; the initial report (i.e., after the first two years) will only include (1) and (2).

Student Name:	Date:
Student ID:	Committee Chair:
Rating of (circle one): A-Exam *OR* B-Exam/Dissertation	Committee Members:

	1 = Unacceptable	**3 = Proficient**	**5 = Exemplary**	**Rating (1,2,3,4,5)**
Breadth & Depth of Disciplinary Knowledge	Demonstrates lack of knowledge of fundamental concepts in statistical theory and practice and/or fails to communicate an adequate grasp of relevant literature.	Demonstrates clear understanding of key statistical principles and the ability to effectively use and extend existing methodology. Communicates adequate knowledge of relevant literature.	Demonstrates comprehensive understanding of modern statistical methods and literature. Shows potential to both articulate and devise creative solutions to research problems.	
Critical thinking	Confusing presentation with errors in reasoning, a general lack of synthesis, and/or cursory, superficial analysis.	Adequate reasoning, explanation of assumptions, and sufficient development of mathematical and simulation-based evidence.	Student meets proficiency standard; in addition, arguments are predominately clear and organized, reflecting original, logical and complex thought processes.	
Originality of Research ***(N/A if A exam is an oral exam without a student research presentation)***	Research agenda lacks originality and/or compelling motivation, or represents a trivial extension of existing theory or methodology.	Research agenda is considered to be substantive and well-motivated. Successful completion requires creative solutions from the student.	Research agenda is considered to be highly novel, requiring an entirely new theory or methodology in order to resolve open research questions in a rigorous, principled manner.	
Effective written communication ***(N/A if A exam is an oral exam without a student research presentation)***	Writing lacks clarity, with consistent errors and/or poor organization. Inadequate review and explanation of literature. Key mathematical results incorrect, or lacking important detail.	Writing is clear, concise, and organized, with few grammatical errors. Appropriate review and explanation of literature. Logical development and presentation of technical results supported with adequate mathematical detail.	Elegant writing and organization with fully developed literature review and correct grammar. Logical development and presentation of technical results supported with clear, convincing and insightful arguments that reflect an appropriate level of detail.	
Effective Oral Communication	Uses weak, flawed or unsubstantiated arguments in motivating research and/ answering questions from committee and/or visual aids fail to convey information in a clear, concise fashion.	Uses transparent, valid reasoning to motivate research and/or in response to questions raised by the Committee or other audience members. Clear, concise and organized visual aids.	Student meets proficiency standard; in addition, student is articulate and persuasive in his/her arguments when motivating research and/or in responding to questions raised by the Committee or other audience members.	
Overall Rating (note: on the whole, not necessarily average of earlier ratings)	Unacceptable	Proficient	Exceptional	

	Count
Submitted Papers (derived from dissertation work)	
Published Papers (derived from dissertation work)	
Submitted Papers (total)	
Published Papers (total)	
Presentations (Student Seminar Series)	
Presentation (National/International)	

Initial Job Placement: