

Biostatistics PhD

Biostatistics PhD Mission Statement

Program Mission Statement (Full Description):

To advance the understanding of the theory and methodology of statistical science by engaging in the most effective education processes and in substantial research activities with the specific intent of preparing students for research careers in the medical/pharmaceutical environment.

Students in the Biostatistics PhD program spend 2 years taking classes at the SMU main campus and 2 years working in a lab as a statistical consultant at UTSW medical center. Most of the time, the student's lab experience results in dissertation level research.

Does your program offer courses at an off-campus instructional site (not at SMU Dallas campus)?: Yes

Does your program offer courses through distance education technology (e.g., asynchronous, synchronous, or both)?: No

During which academic year were students first enrolled in this program?: Prior to AY2020-2021

Progress: Complete

1 Knowledge of statistical theory

Step 1C: PLO Statement (Full Description):

Students will demonstrate knowledge of statistical theory.

Step 2A: Measure :

Every spring, first year graduate students take two basic exams, one in statistical theory and the other in statistical methods, to measure their comprehension of first-year material. Students can pass the exam at the master's level or the PhD level, or they can fail the exam. Students who pass at the master's level or who fail the exam can retake the exam the following year to attempt to pass at the PhD level. The exam is created by the faculty each year. Every year it has different questions, and thus the difficulty level is different. Therefore, we do not have a set score for passing the exam at each level. Each member of the faculty is responsible for submitting at least one question to each portion of the exam (theory and methods). Then, that faculty member grades the question they submitted for each student along with a second grader from the faculty. The two graders for each question independently grade student submissions and then meet together to reconcile any discrepancies in scores. Exams are graded blindly in that student responses are identifiable only by a number assigned by the department administrator. The code is not broken until all questions are graded and the faculty meet to decide what constitutes a passing score at each level for the given year.

Attached Files

[2023 Basic Theory exam part 1.pdf](#)

[2023 Basic Theory exam part 2.pdf](#)

Step 2B: Type of Measure (check all that apply): Qualifying exam

Step 2C: Is Measure direct or indirect?: Direct

Step 3A: Target for Measure:

90% of students will pass the basic theory exam at the PhD level on the first attempt.

Step 4A: Was the target met for this Measure?: Met

Step 4B: Results and Findings for this Measure:

Four students took the basic theory exam. All four passed at the PhD level on the first attempt. See the attached scoring sheet for detail.

Attached Files

[biostat.phd.assess.data.2023.xlsx](#)

Step 4C: Interpretation of Results :

As the basic exam and the first-year courses have remained much the same for several years, passing rates generally reflect our ability to recruit competent students. In general, we have had very few biostatistics students who passed the exam at the master's level or failed the exam. Because the exam itself changes from year to year, it is hard to measure whether the passing rate reflects student competency or program success. The fact that this is not a standardized exam is a weakness. The concepts tested are the same from year to year, even though the precise questions might not be.

Step 5A: Use of Results for Seeking Improvement (Action Plan) :

The basic exam is a long standing piece of many graduate programs. Every year, the questions on it change to reflect material taught to students, but in general, the concepts taught are the same from year to year. In addition, it is important that this exam be given at the beginning of a student's graduate career after their first year of classes, because without the knowledge of basic statistical theory, a student cannot reasonably be expected to have the background necessary to complete a dissertation.

Step 5B: Type of Action: Other

Step 5C: Dialogue Participants (check all that apply): Faculty

Step 5D: Evidence of Dialogue :

A meeting sharing these results will take place after the July 31 deadline, probably in early September. It has not been scheduled.

Step 5E: Type of other Improvements (check all that apply): Other

Step 5F: Other Improvements (Full Description):

We have been offering previous year's exams to students so that they can work through them as practice for the basic exam. This way, all students have access to the same material. We post the previous exams at the beginning of each fall semester and give the students access. Last year, we started a Canvas course for the basic exams, but it was not well publicized. We will continue to improve the Canvas course and talk about it more in first year classes.

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

We do not plan to change this method of program assessment. However, as mentioned earlier, although the concepts taught are the same from year to year, the questions on it change to reflect material taught to students. The main change is making access to previous basic exam questions accessible to all students at the same time.

Step 6B: Status Update on Previously Identified Action Plan(s): Not applicable for this cycle (explain in Step 6A)

Progress: Complete

2 Knowledge of statistical methods

Step 1C: PLO Statement (Full Description):

Students will demonstrate knowledge of statistical methods.

Step 2A: Measure :

Every spring, first year graduate students take two basic exams, one in statistical theory and the other in statistical methods, to measure their comprehension of first-year material. Students can pass the exam at the master's level or the PhD level, or they can fail the exam. Students who pass at the master's level or who fail the exam can retake the exam the following year to attempt to pass at the PhD level. The exam is created by the faculty each year. Every year it has different questions, and thus the difficulty level is different. Therefore, we do not have a set score for passing the exam at each level. Each member of the faculty is responsible for submitting at least one question to each portion of the exam (theory and methods). Then, that faculty member grades the question they submitted for each student along with a second grader from the faculty. The two graders for each question independently grade student submissions and then meet together to reconcile any discrepancies in scores. Exams are graded blindly in that student responses are identifiable only by a number assigned by the department administrator. The code is not broken until all questions are graded and the faculty meet to decide what constitutes a passing score at each level for the given year.

Attached Files

[Day1MethodsExam.docx](#)

[Day2MethodsExam.docx](#)

Step 2B: Type of Measure (check all that apply): Qualifying exam

Step 2C: Is Measure direct or indirect?: Direct

Step 3A: Target for Measure:

90% of first year students will pass the exam at the PhD level on the first attempt.

Step 4A: Was the target met for this Measure?: Met

Step 4B: Results and Findings for this Measure:

All four students who took the basic exam achieved a passing score on the methods section.

Step 4C: Interpretation of Results :

As the spirit of the basic exam and the first-year courses have remained much the same for several years, passing rates generally reflect our ability to recruit competent students.

The basic exam is a long standing piece of many graduate programs. Every year, the questions on it change to reflect material taught to students, but in general, the concepts taught are the same from year to year. In addition, it is important that this exam be given at the beginning of a student's graduate career after their first year of classes, because without the knowledge of basic statistical theory, a student cannot reasonably be expected to have the background necessary to complete a dissertation.

Step 5A: Use of Results for Seeking Improvement (Action Plan) :

The basic exam is a long standing piece of many graduate programs. Every year, the questions on it change to reflect material taught to students, but in general, the concepts taught are the same from year to year. In addition, it is important that this exam be given at the beginning of a student's graduate career after their first year of classes, because without the knowledge of basic statistical theory, a student cannot reasonably be expected to have the background necessary to complete a dissertation.

Step 5B: Type of Action:

Step 5C: Dialogue Participants (check all that apply): Faculty

Step 5D: Evidence of Dialogue :

Results will be shared in a faculty meeting after the July 31 deadline. There is no evidence at this time.

Step 5E: Type of other Improvements (check all that apply): Other

Step 5F: Other Improvements (Full Description):

We do not plan to change this method of program assessment. However, as mentioned earlier, although the concepts taught are the same from year to year, the questions on it change to reflect material taught to students. The main change is making access to previous basic exam questions accessible to all students at the same time.

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

Faculty will discuss the findings of this assessment at the first faculty meeting for fall 2023. We will have a status update at a later time.

Step 6B: Status Update on Previously Identified Action Plan(s): In progress

Progress: Complete

3 Comprehension of Statistical Literature

Step 1C: PLO Statement (Full Description):

Students will demonstrate ability to comprehend statistical literature.

Step 2A: Measure :

In their second year of the program, students are required to write a paper that is based on three papers on a similar topic given to them by a faculty member. Each student is to read, summarize, and synthesize the three papers. Two faculty members read each synthesis and make comments on the paper. We use this synthesis as the basis to measure student comprehension of the literature.

Attached Files

[PhD qualifying exam instructions2020.pdf](#)

Step 2B: Type of Measure (check all that apply): Document analysis
Written paper/project

Step 2C: Is Measure direct or indirect?: Direct

Step 3A: Target for Measure:

All students will produce a successful synthesis on the first try.

Step 4A: Was the target met for this Measure?: Met

Step 4B: Results and Findings for this Measure:

All four students who took the PhD candidacy exam in AY 2022–2023 passed it. Each exam was reviewed by two faculty members, who made varying numbers of comments on the "Review of Core Papers" (synthesis) section, depending on the quality of the student's comprehension and writing ability. All students who sit for the candidacy exam have taken at least one biostatistics course that includes a component in which they read an article from the literature, speak about it, and write a short summary of it.

A synthesis section from one student is attached as an example. We do not have a spreadsheet as students are marked by separate faculty members, and the marking is done at different times during the AY. All students are told their results via email from the exam readers.

Attached Files

[SynthesisExample.pdf](#)

Step 4C: Interpretation of Results :

Students are able to summarize and synthesize the results of papers published in the statistical literature. With the advent of ChatGPT and other generative AI sources, faculty will have to establish rules on using such items on the synthesis part of the paper.

Step 5A: Use of Results for Seeking Improvement (Action Plan) :

The synthesis section is assessed via qualitative comments. Faculty need to develop a rubric to determine what exactly is expected from this measure and a standardized method of calculating scores and comparing them from year to year. It is our experience that students usually do quite well on the synthesis paper.

Step 5B: Type of Action: Faculty involvement

Step 5C: Dialogue Participants (check all that apply): Faculty

Step 5D: Evidence of Dialogue :

At the first faculty meeting in the fall of 2023 we will discuss standardizing the assessment of the synthesis project with a rubric to make comparison from year to year somewhat easier. There is no evidence of dialogue at this time.

Step 5E: Type of other Improvements (check all that apply): Other

Step 5F: Other Improvements (Full Description):

We do not anticipate changes to the program as a result of the findings of the assessment of this PLO.

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

In the spring of 2023, the SDS faculty voted to change the PLOs for the PhD in Biostatistics. The prior PLO was "develop a dissertation research plan", which was not specific enough. This is the first year we have evaluated this particular PLO; therefore, we do not have an update on changes from the previous cycle.

Step 6B: Status Update on Previously Identified Action Plan(s): Not applicable for this cycle (explain in Step 6A)

Progress: Complete

4 Filling in the gaps in statistical theory

Step 1C: PLO Statement (Full Description):

Students will apply knowledge from course work to fill in the gaps from theory presented in a scholarly work.

Step 2A: Measure :

In their second year of the program, students are required to write a paper that is based on three papers on a similar topic given to them by a faculty member. Each student is to read, summarize, and synthesize the three papers. In addition, the student must select a proof or theoretical argument or simulation from one (or more) of the three papers can complete the argument in writing. The final result is a paper of no more than 30 pages containing the summary, synthesis, technical details, and suggestions for further research, gleaned from the three papers. Two faculty members read and comment on the paper. This assessment is qualitative. Most students receive comments from the faculty members and are asked to update or correct their work accordingly, must like the process of going through a journal article review.

Attached Files

Step 2B: Type of Measure (check all that apply): Document analysis
Written paper/project

Step 2C: Is Measure direct or indirect?: Direct

Step 3A: Target for Measure:

All students will successfully supply technical details on the first attempt for at least one of the three papers that are part of the synthesis paper.

Step 4A: Was the target met for this Measure?: Met

Step 4B: Results and Findings for this Measure:

All four students who took the PhD candidacy exam in AY 2022–2023 passed it. Each exam was reviewed by two faculty members, who made varying numbers of comments on the “Technical Details” section depending on the quality of the student’s comprehension and writing ability.

Step 4C: Interpretation of Results :

Comparison is difficult because the comments are qualitative, students have different writing ability, some students have a first language other than English, and the three papers for synthesis are different. In the next assessment cycle, the use of this tool will be complicated by the existence of ChatGPT and other generative AI platforms. Faculty will have to set rules on the use of ChatGPT for this assignment.

Attached Files

[TechnicalDetailsExample.pdf](#)

Step 5A: Use of Results for Seeking Improvement (Action Plan) :

Faculty teaching first year courses have begun to emphasize synthesis of papers and filling in technical details of proofs and arguments for shorter assignments in order to give students practice with this sort of assessment. Students have responded positively to the practice, but it is too early to tell if the extra practice in first year courses will have an impact on quality of student work in the future.

Step 5B: Type of Action: Additional emphasis or time on content
Additional activities or assignments

Step 5C: Dialogue Participants (check all that apply): Faculty

Step 5D: Evidence of Dialogue :

The issue of ChatGPT will be discussed at the first faculty meeting in the fall of 2023. We will also discuss standardizing the assessment of the synthesis project with a rubric to make comparison from year to year somewhat easier. There is no evidence of dialogue at this time.

Step 5E: Type of other Improvements (check all that apply): Other

Step 5F: Other Improvements (Full Description):

We do not anticipate changes to the program as a result of the findings of the assessment of this PLO.

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

In the spring of 2023, the SDS faculty voted to change the PLOs for the PhD in Biostatistics. The prior PLO was "complete and defend research", which was not specific enough. This is the first year we have evaluated this particular PLO; therefore, we do not have an update on changes from the previous cycle.

Step 6B: Status Update on Previously Identified Action Plan(s): Not applicable for this cycle (explain in Step 6A)

Progress: Complete

1 Student employment

Step 1C: PO Statement (Full Description):

Graduates will find employment in a quantitative field in medical basic science, clinical science, or public health

Step 2A: Measure :

Survey of outgoing graduates of the program.

Step 2B: Is Measure direct or indirect?: Direct

Step 3A: Target for Measure:

All students will find employment in a field related to biostatistics.

Step 4A: Was the target met for this Measure?: Partially Met

Step 4B: Results and Findings for this Measure:

Three of four students who graduated in AY 2022–2023 found jobs prior to graduation — two in the pharmaceutical industry and one in academic research institution. All will work as biostatisticians in medical science applications. The fourth student delayed her job search for family reasons but has applied for a biostatistics reviewer position at the FDA and expects to be interviewed in Summer 2023.

Step 4C: Interpretation of Results :

It is fairly easy to find jobs in biostatistics as the field is in demand. We cannot control student job search on personal grounds. These results are typical of prior years.

Step 5A: Use of Results for Seeking Improvement (Action Plan) :

No action is necessary.

Step 5B: Dialogue Participants (check all that apply): Faculty

Step 5C: Evidence of Dialogue :

Results of this assessment will be discussed at the first faculty meeting in the fall of 2023. We have no evidence at this time.

Step 5D: Type of other Improvements (check all that apply): Other

Step 5E: Other Improvements (Full Description):

We do not plan any improvements at this time. The job market for PhD biostatisticians is very strong.

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

No updates at this time. We expect the job market to remain excellent for graduates of the PhD in biostatistics program for some time.

Step 6B: Status Update on Previously Identified Action Plan(s): Not applicable for this cycle (explain in Step 6A)

Progress: Complete

Step 5D: Type of other Improvements (check all that apply):

Step 5E: Other Improvements (Full Description):

Step 6A: Status Update on Action(s) Identified in the Previous Assessment Cycle (Full Description):

This is a new programmatic objective.

Step 6B: Status Update on Previously Identified Action Plan(s): In progress

Progress: Complete