Annual Academic Assessment Report

Department of Mathematical Sciences

MATHPH

2024-2025

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Across the many programs within the Department of Mathematical Sciences (BA/BS, MS, PhD) there are common learning objectives recognized by the faculty. While the program requirements show differences in the skills and tools employed within the various options, the learning objectives are stated broadly to apply to each.

- Critical and analytical thinking
- Effective communication of abstract and technical information
- Logical reasoning
- Mastery of computational tools for analyzing data and/or mathematical structure
- Problem solving
- Understanding of algorithms and processes

The data below is from the Office of Strategic Analytics & Insights and records the number of Doctorate degrees awarded in the last seven years (average: 4).

2018	2019	2020	2021	2022	2023	2024
2	6	4	2	6	6	3

Note: data from 2025 is not available yet.

Several of these students go onto academic positions either as postdocs or tenure-track assistant professors.

Analysis of Assessment of Student Learning Outcomes

The Department of Mathematical Sciences employs five main tools for assessing the student learning outcomes of the PhD-level graduate students in our department.

A. Course work
B. Qualifying Examination
C. Candidacy Examination
D. Thesis
E. Exit Interview Survey

A. *Course Work*: Students complete a rigorous program of courses that is routinely monitored and updated by the department's Graduate Committee. Courses include assignments that

assess the previously mentioned learning outcomes by means of written work (both computational and theoretical) and presentations (both formative and summative). The assignments involve a mixture of individual work and work in groups.

B. *Qualifying Examination*: Students must pass three 4-hour long examinations in accordance with the department's Qualifying Examination policy. One of these exams may be substituted by receiving an "A" in a year-long qualifying sequence.

Each exam is co-written by the faculty that most recently taught the course and graded separately by the pair to assess the student's knowledge of advanced level mathematics and statistics. All graduate faculty can look at a student's examination post grading. Students may sit for a Qualifying Examination in August or in January.

To date in 2025, two students took at least one Qualifying Examination for a total of 3 examinations given. Of these 3 examinations, 2 were passed at the PhD level and 1 was failed. One student was able to replace a Qualifying Examination with an "A" to complete their Qualifying Examination requirement. At the time of writing this report, ten students were planning to take at least one Qualifying Examination in August 2025.

In 2024, eight students took at least one Qualifying Examination for a total of 14 examinations given. Of these 14 examinations, 10 were passed at the PhD level, 2 were passed at the Master's level, and 2 were failed. Five students were able to replace a Qualifying Examination with an "A."

In 2023, eight students took at least one Qualifying Examination for a total of 15 examinations given. Of these 15 examinations, 10 were passed at the PhD level, 2 were passed at the Master's level, and 3 were failed. Three students replaced a Qualifying Examination with an "A."

C. *Candidacy Examination*: After completing the Qualifying Examination, a student pursuing a PhD must take and pass an Oral Candidacy Examination according to the department's policy. The student's performance is evaluated by a committee consisting of the student's intended PhD advisor and two other graduate faculty chosen in consultation with the advisor.

The format is decided by the advisor and consists of either a presentation followed by questions, or an oral examination over advanced course work.

To date, one student has taken the Oral Candidacy Examination in 2025. Three students successfully passed their Oral Candidacy exam in 2024. Four students successfully passed their Oral Candidacy Examination in 2023.

D. *Thesis*: A thesis must be written and successfully defended before a committee consisting of the PhD advisor and two other graduate faculty chosen in consultation with the advisor. The thesis and its defense are assessed by the committee for its contribution to and significance in the relevant discipline.

To date in 2025, there have been two successful PhD thesis defenses. The titles of these are stated below along with the name of the defending student:

- *Koszul Cohomology of Canonical Products,* Alexander Duncan
- *Simulations of Richtmyer-Meshkov Instability Using High Order WENO Methods*, Ryan Holley

At the time of this report, there are plans for three more PhD defenses by the end of this academic year:

- *Physics Informed Neural Networks in Incompressible Navier Stokes Equations and Compressible Euler's Equation,* Xuan Gu
- *The Cannon-Thurston Map for Relatively Hyperbolic Free-by-Cyclic Groups,* Kailey Perry
- *Utilizing the Horseshoe Prior in Exploratory Factor Analysis and Gaussian Graphical Networks,* James Roddy

E. *Exit Interview Survey*: The exit interview was initiated in Spring 2024 and has only been taken by six MATHPH students so far, three in 2024 and three in 2025. Due to the small sample size, we have combined these results.

Item	**2024/2025**
Quality of instruction from faculty in the department	4.33
Concern of department faculty toward graduate students	4.67
Sense of community among graduate students and math faculty	4.17
Quality of support from department for teaching	4.67
Quality of support from department for research	4.67
Overall assessment of the Department of Mathematical Sciences	4.67
The courses required for the degree program were challenging	4.83
The program prepared me well for my career plans	4.67
I would recommend pursuing a graduate degree in mathematics/statistics at the University of Arkansas to others	4.5

Overall, the numbers show that the students the complete the program are satisfied with our faculty and department.

Student comments touched on a wide variety of topics including amount of teaching, stipends, work in MRTC, and more support for Math education. These comments will be passed along to the appropriate groups in our department for their consideration.

Changes To Degree Planned or Made Based on Assessment

We have no immediate plans to change the degree based on this assessment.

Changes To the Assessment Process Planned or Made

We have no plans to change the assessment process currently. It would be good to expand our assessment to monitor students that leave our program early to find out the reasons for this.