

Learning Outcomes Assessment Report for Mathematics (PhD)

Program Context

The Department of Mathematics is one of seven departments making up Purdue's College of Science. The Department has an international reputation as an outstanding center for mathematical education, scholarship and research. Together with visiting researchers and 160 graduate students, its 65 professors provide it with active involvement in current developments in many major areas of mathematics.

The Department offers the Bachelor of Science, Master of Science and Doctor of Philosophy degrees. Also, the Department is closely associated with other programs, including Actuarial Science, Statistics, and Computer Science.

Included below is a report prepared by the Department for the most recent external review committee.

Attached File(s)

 [gradprogram.pdf](#)

Admins for this level

- Steven R Bell

How this level appears in your institution:



Purdue University



West Lafayette



Science



Mathematics



Mathematics (PhD)

Learning Outcomes

- Critical Thinking: Math PhD students will be able to think critically and creatively
- Knowledge and Scholarship: Math PhD students will be able to identify and conduct original research and scholarship
- Ethical and Responsible Research: Math PhD students will conduct research in an ethical and responsible manner
- Effective Communication: Math PhD students will effectively communicate their field of study.

Sources of Learning Outcomes

- University

Additional Information

Discussions at the level of the Graduate Education Policy and Curriculum Committee of the College of Science.

Stakeholder Involvement

Stakeholders Involved

- Faculty

Process for Stakeholder Involvement

- Faculty Meeting
- Faculty Retreat
- Workgroup/Committee

Stakeholder Involvement for Learning Outcome

Members of the Graduate Committee are considered to be representatives of the Faculty at large and have easy access to the Graduate Chair.

Stakeholder Involvement for Learning Activities/Assessment Methods

The Graduate Committee targets areas for improvement and commissions members of the Department to assess and improve programs and courses. All such changes must be approved by the Faculty by vote at a Faculty meeting.

Stakeholder Involvement for Review Process

Presentations are made at Faculty meetings and documents are circulated. Surveys are administered via the Qualtrix system. Votes take place at a subsequent faculty meetings.

Review Process

Review Process

Evaluation rubrics and Faculty feedback to the Graduate Committee.

Self Reflection

Reflect on Student Learning

We have learned that it is possible to teach some old dogs new tricks. Our faculty has grudgingly begun to fill out the new rubrics that the Graduate Committee has foisted upon them.

Reflect on Assessment Process

Although the new rubrics have not revealed anything surprising, the information has proved to be somewhat useful in reporting for various things such as GAANN Fellowship programs and NSF graduate student initiatives.

Learning Outcomes: Details

Learning Outcome

Critical Thinking: Math PhD students will be able to think critically and creatively

Note: This is a Graduate Level Outcome

Performance Criteria

1. Completion of written PhD qualifier exams and Advanced Topics oral exam.

Learning Activities

Problem Based Learning

How this learning activity is used to help students achieve the learning outcome: The summer qualifier exam preparation courses and the courses on which they are based helped to prepare students to pass the four written PhD Qualifier Exams.	Environments: Courses and special summer course
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Additional Information about the Learning Activities

Notes:

Taking the Real Analysis PhD qualifying exam;
taking the Abstract Algebra PhD qualifying exam; taking supervised PhD research credits;
preparing for and taking the dissertation defense exam.

Assessment Methods

Exam/Test

How this method is used to assess students' achievement of the learning outcome: The PhD thesis defense report rubric is used to assess a student's level of accomplishment.	Environments: PhD thesis defense
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Attached File(s)

 [rubric.doc](#)

Qualifying Exam

How this method is used to assess students' achievement of the learning outcome: The four grades on the four written PhD Qualifier Exams are used to determine a level of achievement. A strong pass on the oral Advanced Topics exam report is also indicative of strength.	Environments: PhD qualifier exams
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Additional Information about the Assessment Methods

Notes:

- No Notes Available -

Assessment Evidence & Findings

Finding 1: The pass rate for the PhD Qualifying Exams is reasonable.

Specific assessment evidence supporting the finding and how the evidence supports the finding:

75% of students who took the Real Analysis PhD Qualifying Exam passed it during the academic year 2007-08;

70% of students who took the Abstract Algebra PhD Qualifying Exam passed it during the academic year 2007-08;

The other exams had higher rates of passing.

Annual Evaluation and Final Evaluation of doctoral students is starting to be reported via a new rubric during 2008-09 academic year.

Related Assessment Methods:

- Qualifying Exam

Additional Assessment Evidence & Findings Information

Notes:

- No Notes Available -

Changes and Rationale

As a result of reviewing the assessment evidence, what did or will you change (if anything) to help students achieve an acceptable or higher level of the learning outcome?

The written PhD Qualifier Exams were recently changed to be more flexible and to allow students in

applied math to move more rapidly to doing research. Whereas both exams on real analysis and abstract algebra used to be required, now two exams from a list of four are required, plus two more exams from a longer list.

Impacts of Changes

If any changes were made, what impacts did they have on student achievement of the learning outcome?

Students will move on to the next phase of the program (which is to find a PhD thesis advisor and to pass the Advanced Topics Exam) more rapidly.

Learning Outcome

Knowledge and Scholarship: Math PhD students will be able to identify and conduct original research and scholarship

Note: This is a Graduate Level Outcome

Performance Criteria

1. Completion of course requirements and passing of qualifier exams and advanced topics exams.

Learning Activities

Problem Based Learning

How this learning activity is used to help students achieve the learning outcome: Taking supervised PhD research credits.	Environments: Research
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Project

How this learning activity is used to help students achieve the learning outcome: Publishing research results in peer-reviewed scientific journals.	Environments: Publishing
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Additional Information about the Learning Activities

Notes:

Preparing for and taking the dissertation defense exam.

Assessment Methods

Qualifying Exam

How this method is used to assess students' achievement of the learning outcome: Knowledge and scholarship is assessed by parts of the 8 hour written PhD Qualifier Exams and by completion of required core courses.	Environments: PhD Qualifier Exam
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Additional Information about the Assessment Methods

Notes:

- No Notes Available -

Assessment Evidence & Findings

Finding 1: Most PhD students are obtaining good jobs after graduation.

Specific assessment evidence supporting the finding and how the evidence supports the finding:

We find out in an exit survey what kind of a first job our students obtain and the information is positive and reassuring.

Related Assessment Methods:

- Qualifying Exam

Additional Assessment Evidence & Findings Information

Notes:

- No Notes Available -

Changes and Rationale

As a result of reviewing the assessment evidence, what did or will you change (if anything) to help students achieve an acceptable or higher level of the learning outcome?

The written PhD Qualifier Exams were recently changed to be more flexible and to allow students in applied math to move more rapidly to doing research. Whereas both exams on real analysis and abstract algebra used to be required, now two exams from a list of four are required, plus two more exams from a longer list.

Impacts of Changes

If any changes were made, what impacts did they have on student achievement of the learning outcome?

Students will move on to the next phase of the program (which is to find a PhD thesis advisor and to pass the Advanced Topics Exam) more rapidly.

Learning Outcome

Ethical and Responsible Research: Math PhD students will conduct research in an ethical and responsible manner

Note: This is a Graduate Level Outcome

Performance Criteria

1. Satisfactory evaluation on PhD thesis defense rubric.

Learning Activities

Demonstration

How this learning activity is used to help students achieve the learning outcome: Students are encouraged to attend the University wide seminars on the ethical conduct of research.	Environments: University special seminars
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Additional Information about the Learning Activities

Notes:

- No Notes Available -

Assessment Methods

Performance Task

How this method is used to assess students' achievement of the learning outcome: The number of math PhD students who attend the University wide seminar is recorded.	Environments: Attendance
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Additional Information about the Assessment Methods

Notes:

- No Notes Available -

Assessment Evidence & Findings

Finding 1: Attendance is poor.

Specific assessment evidence supporting the finding and how the evidence supports the finding:

We have been disappointed in the attendance record for our students in the University wide seminar on research ethics.

Related Assessment Methods:

- Performance Task

Additional Assessment Evidence & Findings Information

Notes:

- No Notes Available -

Changes and Rationale

As a result of reviewing the assessment evidence, what did or will you change (if anything) to help students achieve an acceptable or higher level of the learning outcome?

We are considering making attendance mandatory. We are also considering offering a special seminar in the department that is more relevant than the University wide seminar (which deals with issues of human subjects, etc.).

Impacts of Changes

If any changes were made, what impacts did they have on student achievement of the learning outcome?

The PhD rubrics are uniformly clean on the issue of strong ethical behavior for recent PhD students.

Learning Outcome

Effective Communication: Math PhD students will effectively communicate their field of study.

Note: This is a Graduate Level Outcome

Performance Criteria

1. Adequate evaluation on PhD thesis defense rubric.

Learning Activities

Lecture/Presentation

How this learning activity is used to help students achieve the learning outcome: Preparing for and taking the PhD thesis defense exam.	Environments: PhD thesis defense
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Additional Information about the Learning Activities

Notes:

Publishing research results in peer-reviewed scientific journals;
presenting research results in recognized scientific meetings;
taking supervised PhD research credits;
preparing for and taking the dissertation defense exam.

Assessment Methods

Performance Task

How this method is used to assess students' achievement of the learning outcome: The communication aspect of the PhD thesis defense is evaluated by means of a rubric.	Environments: rubric
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Additional Information about the Assessment Methods

Notes:

- No Notes Available -

Assessment Evidence & Findings

Finding 1: Strong marks for communication on rubric.

Specific assessment evidence supporting the finding and how the evidence supports the finding:

PhD students have been earning strong marks for their communication skills on the PhD defense rubric.

Related Assessment Methods:

- Performance Task

Additional Assessment Evidence & Findings Information

Notes:

- No Notes Available -

Changes and Rationale

As a result of reviewing the assessment evidence, what did or will you change (if anything) to help students achieve an acceptable or higher level of the learning outcome?

The PhD thesis defense rubric was only instituted recently. It is having the effect that PhD thesis advisors are becoming more demanding in this area.

Impacts of Changes

If any changes were made, what impacts did they have on student achievement of the learning outcome?

PhD students are writing better theses, better research papers, and giving better presentations at conferences.