

**Student Outcomes Assessment and Success Report AY2019-20** Consult with your college dean's office regarding due date and how to submit. Deans will submit reports to the Office of Assessment & Accreditation annually by October 15.

Unit/Program Name: \_\_\_\_\_MS in Mathematics \_\_\_\_\_ Contact Name(s) and Email(s) Cheng Zhao,\_\_\_\_\_cheng.zhao@indstate.edu

**Part 1a: Summary of Student Learning Outcomes Assessment**

**NOTE: If data from Spring 2020 is missing due to COVID-19 transition issues, please describe these issues, their impact on your ability to assess student learning, and what, if anything, will change as a result.**

1. What learning outcomes did you assess this past year?  If this is a graduate program, identify the Graduate Student Learning Outcome each outcome aligns with.	b. (1) What assignments or activities did you use to determine how well your students attained the outcome? (2) In what course or other required experience did the assessment occur?	c. What were your expectations for student performance?	d. What were the actual data/results?	e. What changes or improvements were made or will be made in response to these assessment results or feedback from previous year's report? Can expand on this in Part 2.
<b>Objective 1:</b> Students will learn to use and construct mathematical proofs. <b>Outcome 1.1:</b> Students will construct direct proofs. G4, G5	<b>Measure:</b> problems on Homework or Quiz or Exam Course: Math 510, Math 511, 512, 531, 603, 612, 640, 650, etc..	<b>Target:</b> 80% of the students completing and passing the course with B grade on the final test will be assessed by the committee as meeting or exceeding expectations	90% of students achieved higher than grade B on their assignments/final grades.	While students are performing well overall, more addition challenges or updated materials will be provided in teaching since the learning online resources are getting rich and easier.
<b>Objective 1:</b> Students will learn to use and construct mathematical proofs. <b>Outcome 1.2:</b> Students will construct proofs by contradiction. G4, G5	<b>Measure:</b> problems on Homework or Quiz or Exam Course: Math 510, Math 511, 512, 530, 603, 612, 640,650	<b>Target:</b> 80% of the students completing and passing the course with B grade on the final test will be assessed by the committee as meeting or exceeding expectations	90% of students achieved higher than B grade on their assignments/final grades.	While students are performing well overall, more addition challenges or updated materials will be provided in teaching since the learning online resources are getting rich and easier.
<b>Objective 1:</b> Students will learn to use and construct mathematical proofs. <b>Outcome 1.3:</b> Students will construct proofs by induction. G4, G5	<b>Measure:</b> problems on Homework or Quiz or Exam Course: Math 510, Math 511, 512, 530, 603, 612, 640, 650	<b>Target:</b> 80% of the students completing and passing the course with B grade on the final test will be assessed by the committee as meeting or exceeding expectations.	90% of students achieved higher than B grade on their assignments/final grades.	While students are performing well overall, more addition challenges or updated materials will be provided in teaching since the learning online

				resources are getting rich and easier.
<p><b>Objective 1:</b> Students will learn to use and construct mathematical proofs.</p> <p><b>Outcome 1.4:</b> Students will construct examples and counterexamples. G4, G5</p>	<p><b>Measure:</b> problems on Homework or Quiz or Exam Course: Math 510, Math 512,513,531, 603, 604, 640, 646</p>	<p><b>Target:</b> 80% of the students completing and passing the course with B grade on the final test will be assessed by the committee as meeting or exceeding expectations.</p>	<p>90% of students achieved higher than B grade on their assignments/final grades.</p>	<p>While students are performing well overall, more addition challenges or updated materials will be provided in teaching since the learning online resources are getting rich and easier.</p>
<p><b>Objective 2:</b> Students will communicate mathematics effectively.</p> <p><b>Outcome 2.1:</b> Students will state mathematical results accurately for a research problem. G4, G5</p> <p><b>Outcome 2.2:</b> Students will conduct an independent investigation of their own problems. G4, G5</p> <p><b>Outcome 2.3:</b> Students will make an oral presentation of their own research report that is accessible to their peers. G1</p> <p><b>Outcome 2.4:</b> Students will make a detailed written report of their research. G1, G2</p>	<p><b>Measure:</b> Student interview with course professor. Courses: Math 695 (research)</p>	<p><b>Target:</b> 80% of the students completing and passing the course with C grade on the final test will be assessed by the committee as meeting or exceeding expectations.</p>	<p>The students in the math 695 class are working on their research paper. 6 students in each semester taking Math 695 and 6 graduated with MS degree.</p>	<p>Students presented research topics in class as well as in the form of online presentation organized by program director and peers: Fall 2019 and Spring 2020, Drs. Jodi Frost, Vin Isaia, Russell Lodge, Cheng Zhao. The synchronous and asynchronous online “smart classroom” presentation environment helps us a lot.</p>
<p><b>Objective 3:</b> Students will demonstrate that they are ready to use their mathematical skills in a post-master’s position.</p> <p><b>Outcome 3.1:</b> Students will be polled after graduation to determine whether they planned to pursue further</p>	<p><b>Measure:</b> Students will be interviewed by the department chair or the chair’s representative.</p>	<p><b>Target:</b> 80% of the students completing the seminar will meet expectations (be happy with their placement) or exceed expectation (be very happy with their placement)</p>	<p>There are 6 graduate students graduated in Spring 2020.</p>	<p>The synchronous and asynchronous online “smart classroom” presentation environment helps us a lot.</p>

studies, had an offer of employment, etc. G1, G2				
<b>Objective 3:</b> Students will demonstrate that they are ready to use their mathematical skills in a post-master's position. <b>Outcome 3.2:</b> Students will demonstrate mastery of mathematics and related content that will allow them to pursue careers utilizing their knowledge. G1, G2	<b>Measure:</b> grade point average in mathematics and related coursework	<b>Target:</b> 80% of the graduating students will meet expectations (at least 3.0 but less than 3.75) or exceed expectation (at least 3.75)  <b>Outcome:</b> the GPA of 80% of the graduating students meets the expectation: GPA at least 3.0.	<b>All of the graduating students are exceed expectation.</b>  <b>Outcome:</b> the GPA of 90% of the graduating students meets the expectation: GPA at least 2.0.	<b>By utilizing online resources and equipment, students demonstrate mastery of mathematics and related content that will allow them to pursue careers utilizing their knowledge.</b>

Note: If you would like to report on more than three outcomes, place the cursor in the last cell on the right and hit "tab" to add a new row.

#### Helpful Hints for Completing this Table

- Use your outcomes library as a reference. Note any alignment with professional standards, as applicable.
- Each outcome should be assessed by at least one direct measure (project, practica, exam, performance, etc.). If students are required to pass an examination to practice in the field, this exam should be included as one of the measures. At least one of the program's outcomes must use an indirect measure (exit interview, focus group, survey, etc.). Use your curriculum map to correlate outcomes to courses. Describe or attach any evaluation tools such as rubrics, scales, etc.
- Identify the score or rating required to demonstrate proficiency (e.g., Students must attain a score of "3" to be deemed proficient; at least 80% of students in the program will attain this benchmark.)
- Note what the aggregate level of proficiency actually was and the number of students included in the cohort or sample (e.g., 85% of the 25 students whose portfolios were reviewed met the established benchmark).

### Part 1b: Review of Student Success Data & Activities

Use [Blue Reports](#) to generate the following information (as well as any other information helpful to you). A dashboard has been created in the Chairs view:

- Cohort Sizes: Spring 2017: 7, Fall 2017: 12, Spring 2018: 11, Fall 2018: 20; Spring 2019: 33; Fall 2019: 51, Spring 2020: 56, Fall 2020: 70
- Year-to-Year Retention: Spring 2017 - Fall 2017: 100%, Spring 2018 - Fall 2018: 82%; Spring 2019 - Fall 2019: 72%, Spring 2020: 100%
- Average time to completion (graduate): 2 years

What worked well in supporting student success this year?

After all graduate faculty completed OICC certificate training (online teaching certificate), the Mathematics faculty finalized major changes to the master's online graduate program in mathematics, it is clear that these changes have facilitated a significant growth in our enrollments by making the program more modern and more flexible for distance graduate students. In addition, the graduate courses have been offered synchronous/asynchronous online and on campus with the use of "smart classrooms." In addition to our existing Master of Sciences program, we also added a new Master of Arts degree program this year, which enlarges our graduate program significantly.

What are the most significant opportunities for improvement upon which to focus in the coming year?

A couple of thoughts:

1. The number of distance students for the Mathematics MS degree has increased tremendously.
2. The major group of graduate students are High school Mathematics teachers (65%) who are looking to get the AP certification to teach dual credits. The other group of graduate students (35%) are interested in taking applied courses in statistics and other applied fields.
3. We will continue to offer more high quality synchronous/asynchronous online graduate courses and research projects.
4. Since a new Master of Arts degree program this year is available, we will have more graduate students in our graduate program significantly.

### Part 1c: Summary of Career Readiness Activities – required for undergraduate programs; optional for graduate programs

**If you submitted a report last year, you only need to resubmit if there are changes to your current career readiness competencies map.**

If you have not previously done so, please submit your Career Readiness Competencies curriculum map along with this report as a separate attachment. You can find the template here: <https://www.indstate.edu/assessment/plan-components>

### Part 2: Continuous Quality Improvement

**Reflect on the information shared above regarding student learning, success, and career readiness. In no more than one page, summarize:**

- 1) the discoveries assessment and data review have enabled you to make about student learning, success, and career readiness (ex: What specifically do students know and do well—and less well? What evidence can you provide that learning is improving? How might learning, success, and career readiness overlap? What questions do your findings raise?)**  
After all graduate faculty completed OICC certificate training (online teaching certificate), the Mathematics faculty finalized major changes to the master's online graduate program in mathematics , it is clear that these changes have facilitated a significant growth in our enrollments by making the program more modern and more flexible for distance graduate students. In addition, the graduate courses have been offered synchronous/asynchronous online and on campus with the use of "smart classrooms." This change has already increased and will continue to increase our enrollments in the program. In addition to our existing Master of Sciences program, we also added a new Master of Arts degree program this year, which enlarges our graduate program significantly.
- 2) findings-based plans and actions intended to improve student learning and/or success (expansion of Part 1a, box e as needed)**  
After all graduate faculty completed OICC certificate training (online teaching certificate), the Mathematics faculty finalized major changes to the master's online graduate program in mathematics , it is clear that these changes have facilitated a significant growth in our enrollments by making the program more modern and more flexible for distance graduate students. In addition, the graduate courses have been offered synchronous/asynchronous online and on campus with the use of "smart classrooms." This change has already increased and will continue to increase our enrollments in the program.
- 3) what your assessment plan will focus on in the coming year**

Our assessment plan in the coming year will be: continue to increase our enrollments, keep graduate student retention rate high, and focus more on assessment of the graduate courses offered.

**4) how this information will be shared with other stakeholders**

In the spring of 2020, we had two graduate faculty meetings regarding mathematics graduate program. At the meetings, graduate faculty in the mathematics graduate program are informed of findings and involved in conversations about using them to make decisions regarding student learning. Also, graduate faculty regularly communicate by emails about the enrollments and retention rates of in the mathematics graduate program in the academic calendar year.

**AY2019-2020 Graduate Student Enrollment in Mathematics: Spring 2017: 7, Fall 2017: 12, Spring 2018: 11, Fall 2018: 20; Spring 2019: 33; Fall 2019: 51, Spring 2020: 56, Fall 2020: 70. From last fall, the Mathematics Graduate students have increased by 38%!**

<b>AY2019-2020</b>	<b>Graduate Courses offered</b>	<b>Enrollment</b>	<b>Retention Rate</b>
<b>Fall 2019</b>	<b>math 510 Intro. To Ananalysis (Cheng)</b>	<b>15</b>	<b>100%</b>
	<b>Math 512 Abstract Algebra (Jodi)</b>	<b>7</b>	<b>100%</b>
	<b>Math530 Real variables (Peng)</b>	<b>22</b>	<b>100%</b>
	<b>Math541 Theory of probability (Mark)</b>	<b>20</b>	<b>100%</b>
	<b>Math613 Applied Linear Algebra (Vin)</b>	<b>23</b>	<b>100%</b>
	<b>Math650 Top:Abstract Algebra (Liz)</b>	<b>1</b>	<b>100%</b>
	<b>Math680 Math Reading (Liz)</b>	<b>1</b>	<b>100%</b>
	<b>Math695 Math Research (Vin, Peng, Cheng)</b>	<b>3</b>	<b>100%</b>
<b>Spring 2020</b>	<b>Math 511 Theory of Numbers (Peng)</b>	<b>15</b>	<b>100%</b>
	<b>Math 537 Mathematical Modeling (Vin)</b>	<b>16</b>	<b>100%</b>
	<b>Math542 Math Statistics (Mark)</b>	<b>21</b>	<b>100%</b>
	<b>Math612 Commutative Algebra (Peng)</b>	<b>29</b>	<b>100%</b>
	<b>Math650 History of Stem Curriculum (Jodi)</b>	<b>5</b>	<b>100%</b>
	<b>Math650 Linear Optimization (Cheng)</b>	<b>23</b>	<b>100%</b>
	<b>Math695 Math Research (Cheng)</b>	<b>4</b>	<b>100%</b>
<b>Summer 2020</b>	<b>MATH 512 Abstract Algebra (Jodi)</b>	<b>16</b>	<b>100%</b>
	<b>Math 604 Fund Concepts Geometry (Liz)</b>	<b>34</b>	<b>100%</b>
	<b>Math 640 Graph Theory (Cheng)</b>	<b>25</b>	<b>100%</b>
	<b>Math 695 Math Research (Jodi and Vin)</b>	<b>2</b>	<b>100%</b>

**Master Degree Awarded: 6**

Thank you so much for sharing your assessment process and findings for AY 2019-20 with the Assessment Council. You will find feedback and ratings on the rubric below. It is understood that some of the feedback might encompass practices that you already engage in but were not documented in this report. As the purpose of this evaluation is focused on recognizing great work and helping faculty improve assessment practice, it is not necessary to retroactively add documentation. Please feel free to let me know if you have any questions or if there is any way I can assist you in further developing assessment practice and use in your program.

This report will be shared with the Associate Dean(s) and Dean of your college and summarized findings will be shared as composite college/institutional data with the President’s Office and the Provost’s team.

Sincerely,

Kelley (x7975)

Program: M.S. Mathematics	Overall Rating: Mature (2.13/3.00)
Strengths	Recommendations
<ul style="list-style-type: none"> <li>• Learning outcomes are clear, specific, and measureable.</li> <li>• Aligned assessments include direct measures taken from across multiple courses to provide more comprehensive data for analysis.</li> <li>• Expectations for student performance are appropriate.</li> <li>• Clear information is provided about how curriculum and pedagogy are thoughtfully improved to support learning in an increasingly online space.</li> <li>• Clear information is provided about how faculty are involved in assessment and how results are shared.</li> </ul>	<ul style="list-style-type: none"> <li>• Because student performance is the same for all of your learning outcomes, it makes me wonder if the data you are analyzing per outcome is differentiated to specifically align only with the outcome at hand. For instance, only questions 2, 5, and 9 align with Outcome 1.1, so the data from these questions is all that is reported for that outcome, and so on.</li> <li>• Avoid using course grades and GPAs as measures of student learning. Course grades, and subsequently, GPAs, often are comprised of much more than student learning performance – absences, lateness, participation, extra credit, etc. – and they are not specific enough to illustrate mastery of an individual outcome in most cases.</li> <li>• Good use of an indirect measure to get student perspectives on their own readiness; however, since your outcome verb is “demonstrate,” you may want to include a direct measure of this as well.</li> </ul>

Evaluation Criteria	3 Exemplary	2 Mature	1 Developing	0 Undeveloped
<p><b>Student Learning Outcomes</b></p>	<p>Identified, aligned learning outcomes are specific, measurable, student-centered, and program-level. Outcomes directly integrate institution or college-level learning goals.</p> <p>Outcomes are consistent across modes of delivery (if applicable).</p> <p>More than one outcome is assessed this cycle, and rationale is provided for why they were selected for assessment.</p>	<p>Identified, aligned learning outcomes are specific, measurable, student-centered, and program-level. Outcomes support institution or college-level learning goals.</p> <p>Outcomes are consistent across modes of delivery (if applicable).</p> <p>At least one outcome is assessed this cycle, and rationale is provided for why it was selected for assessment.</p>	<p>Learning outcomes are identified and alignment with courses is demonstrated.</p> <p>Outcomes are consistent across modes of delivery (if applicable).</p> <p>At least one outcomes is assessed this cycle.</p>	<p>No <b>(program)</b> learning outcomes are identified, and/or alignment of learning outcomes to courses is not demonstrated (e.g. – curriculum map).</p>
<p><b>Performance Goals &amp; Measures</b></p>	<p>Performance goals are clear and appropriate, and rationale is provided for why these were selected.</p> <p>Identified measures and tools are assigned to each outcome, are clear and intentionally designed to address student performance on aligned outcomes, and rationale and examples are provided (e.g. – rubrics, checklists, exam keys). Most are direct measures, and their design enhances the validity of findings.</p> <p>Licensure exams and high-impact practices are reflected in measures (if applicable).</p>	<p>Performance goals are clear and appropriate.</p> <p>Identified measures and tools are assigned to each outcome, are clear and intentionally designed to address student performance on aligned outcomes, and examples are provided (e.g. – rubrics, checklists, exam keys). At least one direct measure is included.</p>	<p>Performance goals are identified with little rationale or clarity.</p> <p>Identified measures are poorly suited to performance goals, underdeveloped, or are solely indirect measures. <b>(in some instances – see notes)</b></p>	<p>No goals for student performance of learning outcomes are identified, and/or no measures are provided.</p>

<p><b>Analysis &amp; Results</b></p>	<p>Data collection process is clear and designed to produce valid/trustworthy results. The process is useful to those collecting and/or interpreting data.</p> <p>Data is collected and analyzed with clear rationale and description.</p> <p>Results are provided with thoughtful discussion of analysis and description of conclusions that can be drawn.</p>	<p>Data collection process is clear and designed to produce valid/trustworthy results.</p> <p>Data is collected and analyzed with clear rationale and description.</p> <p>Results are provided with some discussion of analysis.</p>	<p>Description of data collection is unclear as to process and quality.</p> <p>Some data is collected and analyzed with little rationale or description.</p> <p>Some results are provided with no discussion of analysis.</p>	<p>No information is provided about the data collection process, and/or no data is being collected.</p> <p>No results are provided</p>
<p><b>Sharing &amp; Use of Results for Continuous Improvement</b></p>	<p>A plan for sharing information and included program faculty and appropriate staff in discussion and planning is detailed and enacted. Outcomes and results are easily accessible on the program website or other appropriate designated area.</p> <p>Plans for improvement or change based on results are clear and connected to results. If few students met performance goals, this is included in discussion and plans.</p> <p>Reflection is offered about results or plans moving forward, and compares prior year plans to current outcomes in an effort to foster continuous improvement as a result of assessment process.</p>	<p>A plan for sharing information broadly across program faculty is detailed and enacted.</p> <p>Plans for improvement or change based on results are clear and connected to results. If few students met performance goals, this is included in discussion and plans.</p> <p>Reflection is offered about results or plans moving forward.</p>	<p>Information is provided about sharing results, but sharing is limited in scope or content.</p> <p>Plans for improvement or change based on results are incomplete, vague, or not clearly connected to results.</p> <p>Little reflection is offered about results or plans moving forward.</p>	<p>No information is provided about sharing results and/or plans for improvement or change based on results.</p> <p>No evidence of reflection on results is provided.</p>
<p><b>Overall Rating</b></p>	<p><input type="checkbox"/> Exemplary</p>	<p><input checked="" type="checkbox"/> Mature</p>	<p><input type="checkbox"/> Developing</p>	<p><input type="checkbox"/> Undeveloped</p>

*Please see reviewer notes for more details.*