March 2020

To: All **BSE Mathematics Majors and Post-Baccalaureate Certification** students currently enrolled in 300+ level courses

From: Dr. White

Re: Portfolio Submissions

As you may already know, you will be compiling a Mathematics Content Portfolio to fulfill your requirements for <u>department certification</u>. This semester you will begin (or continue) the process by submitting a sample of work from **ALL MATH** courses (excluding MATH 301, MATH 405) in which you are **CURRENTLY** enrolled. Note, you also need to submit one for CSCI 140: Discrete Structures.

<u>**By Monday, Thursday, April 30**</u>, please submit the following to the Math Office, Wickersham Hall 208.

<u>**FOR EACH COURSE:**</u> each Submission contains 3 parts: stapled together (no folders please)

- A **separate** <u>completed</u> cover page (found at the the end of this document). You **MUST** check off the standards that are addressed in your submitted work in the table on the cover page.

- <u>**One**</u> sample of your "**best work**" from this semester (be carefully selective)

- A **short reflection essay** should be included for each submission(s) and/or course(s). **This essay should indicate why the submitted work for this course meets the requirement(s) indicated in the table** as well as address at least one of the following topics:
    - problem solving strategies used in the college course that are similar to those that you may have used in secondary school or that you may have seen being used during a block experience.
    - Potential overlap that may exist in the mathematical content at the college level and the secondary level.
    - Extensions of secondary mathematics within the mathematical content.
    - How the sample demonstrates the development of higher order thinking (or deeper understanding) more than other evidence that could have been selected.
    - How the sample demonstrates creativity in approach, presentation or techniques.
    - How the sample provided indicates growth in the course relative to course content and objectives.
    - Any other relevant observations

See department website for more information and submission pages.

       IMPORTANT NOTE: when the work is returned to you during the next semester, it is your responsibility to keep it. The portfolio will be utilized as a required component in MATH 405.

Purposes of the Content Portfolio:
1. To have teacher candidates collect evidence of their mathematical growth and understanding in their required mathematics content.
2. To have teacher candidates reflect on their mathematical preparation as it relates to their future teaching throughout their program.

Overall Organization of the Process:
1. Student Selection of "best work" from each 300-400 level mathematics content course taken at Millersville University (required and elective), plus CSCI 140. (Note: this does not include Math301.)

2. Evaluation by Portfolio committee following a specific checklist and rubric (pp. 3-4).

3. <u>Possible sources of best work</u> include anything that has been **<u>submitted for a grade or evaluation. It MUST be clear that this work has been graded</u>**. All work must be that of the student completing the portfolio. Examples may include, but are not limited to, the following:
   a. quizzes, or quiz questions
   b. tests, or test questions
   c. problem sets
   d. proofs
   e. homework problems
   f. projects
   g. papers
   h. extra credit problems

4. By completion of their program, in addition to having specific content work from each of their 300-400 level mathematics courses, teacher candidates in the BSE in Mathematics major will have evidence provided in their portfolio of each of the following standards of the National Council of Teachers of Mathematics. Please look carefully at the included rubric for clear expectations of such evidence.
   a. <u>Effective use of Technology</u>: Candidates embrace technology as an essential tool for teaching and learning mathematics. (This does NOT include the typing of mathematical symbols in word processing.)
   b. <u>Problem Solving</u>: Candidates know, understand and apply the process of mathematical problem solving.
   c. <u>Mathematical Communication</u>: Candidates communicate their mathematical thinking orally and in writing to peers, faculty and others.
   d. <u>Mathematical Representation</u>: Candidates use varied representations of mathematical ideas to support and deepen students' mathematical understanding.
   e. <u>Mathematical Connections</u>: Candidates recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding.
   f. <u>Discrete Mathematics</u>: Candidates apply the fundamental ideas of discrete mathematics in the formulation and solution of problems.

5. A **short reflective essay** about the course will accompany the evidence from each specific course that is to be included in the portfolio. When possible, the reflections should connect the evidence to the candidates' future careers in education. For example, although not required for each, reflections may also contain discussion of
    a. Similar problem solving strategies that may be used in secondary schools (may have been witnessed in their own backgrounds or in their block experiences).
    b. Potential overlap that may exist in the mathematical content and secondary mathematics.
    c. Extensions of secondary mathematics within the mathematical content.
    d. How the sample demonstrates the development of higher order thinking (or deeper understanding) more than other evidence that could have been selected.
    e. How particular evidence demonstrates creativity in approach, presentation or techniques.
    f. How work provided indicates growth in the course relative to course content and objectives.

6. Any questions or concerns, please contact Dr. Shao or Dr. Wismer

7. This Assessment is a required component of the BSE in Mathematics degree. Failure to complete any part will result in the following:
    Notification from and/or Consultation with Drs. Wismer/Shao
    Notification of and/or Consultation with Advisor
    Consultation with the Mathematics Department Chair
    Recommendations for completing requirements or changing major

NOTE: It is the responsibility of the student to keep his/her work in the development of a comprehensive portfolio. At this time, the committee will only look at elements separately and keep a record of the progress of each student.

Each portfolio submission is scored for Process Standards, Submission, and the Overall Reflection Essay quality as indicated with the following three rubrics.

Scoring of Process Standards

2: Superior (Target):	The submission addresses the indicated domain and successfully connects the submitted work sample in the essay.
1: Satisfactory:	The submission addresses the indicated domain, and the submitted work sample contains appropriate evidence, but no specific link is made to the work itself.
0: Unsatisfactory:	The submission contains very little discussion of the indicated domain in the essay and/or the submitted work sample does not contain any evidence of the indicated domain.

Scoring of Submission:
2: Satisfactory – Appropriate work and essay has been submitted
1: Unsatisfactory – Either appropriate work or essay has not been submitted

Evaluation of the Overall Reflection Essay:
- 2: Superior – Candidate's reflection adequately addresses at least one process standard domain, and a least one connection is made between the mathematical content and process standards and their future teaching.
- 1: Satisfactory – Candidate's reflection either does not address any process standard domain or does not make any connection between the mathematical content and process standards and their future teaching.
- 0: Unsatisfactory – Candidate's reflection does not address any process standard domain and does not make any connection between the mathematical content and process standards and their future teaching.

Domains:

Knowledge of Technology: Expectations measured by addressing one or more of the following: using knowledge of mathematics to select and use appropriate technology such as: spreadsheets, dynamic graphing tools, computer algebraic systems, dynamic statistical packages, graphing calculators, data-collection devices, and presentation software.
Examples of courses which may address this component are MATH 311, 312, 333, 353/355, or 375.

Knowledge of Problem Solving: Expectations measured by addressing one or more of the following: applying and adapting a variety of strategies; solving problems arising in mathematics or involving mathematics in other contexts; building new mathematical knowledge through problem solving; and reflection of the problem solving process.
Examples of courses which may address this component are MATH 311, 319, 322, 333, 353/355, 365, 375, 395, 467, or 471.

Knowledge of Mathematical Communication: Expectations measured by addressing one or more of the following: effective communicating in writing mathematical thinking; precisely expressing ideas using mathematical language; communicating organized mathematical thinking; and analyzing and evaluating mathematical thinking and strategies.
Examples of courses which may address this component are MATH 310, 322, 345, 353/355, or 464.

Knowledge of Mathematical Representation: Expectations measured by addressing one or more of the following: modeling or interpreting physical, social or mathematical phenomena using representations; creating or using representations to organize, record or communicate mathematical ideas; and selecting, applying or translating among mathematical representations to solve problems.
Examples of courses which may address this component are MATH 322, 333, 365, 375, 395, or 471.

Knowledge of Mathematical Connections: Expectations measured by addressing one or more of the following: recognizing or using connections among mathematical ideas; recognizing or applying mathematics in contexts outside of mathematics; and demonstrating the interconnections of mathematical ideas to build a coherent whole.
Examples of courses which may address this component are MATH 333, 345, 353/355, 393, or 464.

Knowledge of Discrete Mathematics: Expectations measured by addressing one or more of the following: demonstrating knowledge of discrete mathematics with graph theory, recurrence relations, finite difference approaches, linear programming, or combinatorics; applying fundamental ideas of discrete mathematics in the formulation and solution of real-world problems; and using technology to solve problems involving discrete structures and the application of algorithms.
Examples of courses which may address this component are MATH 310, 370, 393, 395; or CSCI 140.

Content Portfolio Cover Page and Record Matrix – Submit 1 FORM PER COURSE

Name: _____   M# _____

Anticipated Semester for Student Teaching: _____

Select ONE sample of your 'best' work from the course you indicate below.

Coursework Submitted
(please ✓)

_____CSCI 140

_____MATH 310

_____MATH 311

_____MATH 322

_____MATH 333 (335/435)

_____MATH 345

_____MATH 353/355

_____MATH 464

<u>MATH Electives (not MATH 301)</u>

_____**MATH**_____

_____**MATH**_____

Please indicate in the table if the work submitted for this course meets the specific requirement (see rubric for specifics).

In addition to the guidelines for the short reflective essay you MUST ALSO <u>use the reflective essay to indicate in what way each selected component is met.</u>

(please ✓)	Evidence of…	Score (0-1-2)/Comment
	Effective use of Technology in Teaching and Learning	
	Problem Solving	
	Mathematical Communication	
	Mathematical Representation	
	Mathematical Connections	
	Discrete Mathematics	

<u>Scoring:</u> _____ Submission (1-2)   _____ Reflection Statement (0-2)

Scoring of Submission:
2: Satisfactory – Appropriate work and essay has been submitted
1: Unsatisfactory – Either appropriate work or essay has not been submitted

Evaluation of the Overall Reflection Statement:
- 2: Superior – Candidate's reflection adequately addresses at least one process standard domain, and a least one connection is made between the mathematical content and process standards and their future teaching.
- 1: Satisfactory – Candidate's reflection either does not address any process standard domain or does not make any connection between the mathematical content and process standards and their future teaching.
- 0: Unsatisfactory – Candidate's reflection does not address any process standard domain and does not make any connection between the mathematical content and process standards and their future teaching.

Scoring of Process Standard Domains:

2: Superior (Target): The submission addresses the indicated domain and successfully connects the submitted work sample in the essay.

1: Satisfactory: The submission addresses the indicated domain, and the submitted work sample contains appropriate evidence, but no specific link is made to the work itself.

0: Unsatisfactory: The submission contains very little discussion of the indicated domain in the essay and/or the submitted work sample does not contain any evidence of the indicated domain.