Full Professional Report

on the

Four Year Plan for the 2012-2016 Academic School Years for

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Note: An electronic version of this document can be found at:
http://course1.winona.edu/eerrthum/Reports/FullReport2016.pdf

Criteria Goals and Outcomes

CRITERION 1: Teaching Effectiveness

GOALS:

1. I plan to continue to develop and modify teaching materials and syllabi, especially for courses that include material outside the standard text.

   Outcome(s): During the last four years, I have

   a. Created a comprehensive set of slides (i.e. gap notes) for MATH140 – Applied Calculus that are utilized during lecture and available to students to download and take notes on. These have been so successful in this course that I've begun to create similar gap notes for other courses (e.g. MATH212 – Calculus I). Details can be found in Appendix A.1.

   b. Created course materials (lecture notes, classroom activities, assessments) for MATH242 – Linear Algebra which I taught for the first time in Fall 2014. Details can be found in Appendix A.2.

   c. Created course materials (lecture notes, classroom activities, assessments) for MATH247 – Discrete Mathematics which I taught for the first time in Fall 2015. (This was also the first time such a course had been offered by our department in the last decade.) Details can be found in Appendix A.3.

   d. Created new materials for MATH327 – Foundations of Mathematics designed to incorporate a more inquiry-based learning approached. These materials were put into use in Spring 2015 and currently in Fall 2016. Details can be found in Appendix A.4.

   e. Created (in conjunction with Chris Malone) course materials (lecture notes, classroom activities, assessments) for MATH395 – Professional Skills in Mathematics which I co-taught for the first time in Spring 2015. This was also the first time such a course had been offered by our department. Details can be found in Appendix A.5.

2. I plan to maintain a detailed schedule for my classes that can be used and/or modified across semesters.

   Outcome(s): During the last four years, I have

   a. Created new schedules for the new courses that I taught (e.g. MATH242, MATH247, MATH395). Details can be found in Appendix A.6.

   b. Modified my existing schedule for MATH140 to emphasize certain sections and chapters over others in an attempt to better serve the student population in this course. Details can be found in Appendix A.6.

   c. Kept detailed schedules for all my classes. During the course, these are available on my course1 webpage (and link to from D2L) for students and colleagues to view and use. Details can be found in Appendix A.6.

3. I plan to continue to make course materials available to students online through D2L and/or my course1 web page.

   Outcome(s): During the last four years, I have used a combination of D2L and my course1 website to post an online syllabus with complete schedule and to upload quiz solutions, sample exams, etc.

4. I plan to continue to create and administer periodic assessments in my classes.

   Outcome(s): During the last four years, I have been working on increasing and diversifying my assessment library in all my classes.

5. I plan to continue to find and implement innovative ways of assessing daily student work (i.e homework) especially through online assessment tools, classroom presentations, etc.

   Outcome(s): During the last four years, I have

   a. Had success with a mix of online homework and student presentations in class. In MATH140 I've been using an online homework system hosted by the publisher of the text. In other service courses, I have used WebAssign or, more recently, the free open-source system WeBWorK. Since WeBWorK is not tied to a specific publisher or text, using the open-source option has significantly lowered costs for students both in the cost of the homework system and the cost of the text.

   b. Had success in the classroom with students presenting homework problems at the board. In addition, I've moved to an inquiry-based-inspired version of MATH327 that consists of students peer-reviewing each other's work.

c. Used in-class presentations in MATH395 as an effective tool for increasing our students' professionalism and ability to give the types of technical talks required after graduation.

6. I plan to continue to conduct student evaluations of my courses and use that feedback to implement changes as needed.

   Outcome(s): During the last four years, I have been collecting student evaluations for each class. The most useful question has been "What advice would you give to a student in the first week of this course?" The responses that students give offer great insight into whether I'm achieving my goals as an educator and/or if something isn't working as I hoped. Summary data of course evaluations can be found in Appendix B.

Additional Actions Not Included in the Original Plan

7. Since Spring 2014, I have been participating in our department's attempts at collecting data in our GEP courses to assist in future program/department reviews. This data has been store in a common departmental location and will start being analyzed during the Fall 2016 semester.

CRITERION 2: Scholarly or creative achievement or research

GOALS:

1. I plan to continue working with students on various research topics.

   Outcome(s): Since AY2012-13, I have worked with a total of 4 students on 4 different research projects. One of these projects initiated further research in the topic and resulted in a scholarly publication. Another topic was also built upon and resulted in a conference presentation. This research topic will likely be continued during a future sabbatical.

2. I plan on presenting at the regional and/or national conferences that I attend.

   Outcome(s): I presented at the national Joint Mathematics Meeting in Seattle in January 2016 on my inquiry-based approach to MATH327 (Foundations of Mathematics). I presented at the regional MAA-NCS Spring Conference in April 2016 on research extending results that were found in one of the student projects mentioned in Goal 1. above. Presentation materials can be found in Appendix C.

3. I plan on continuing to develop a research program in mathematics.

   Outcome(s): I have had some success maintaining a program of research by incorporating students as mentioned above. However, it has been difficult to find time to dedicate to research activity because of full and/or overload teaching assignments in recent semesters. For context, the Mathematical Association of America Guidelines (Article C.5.a.ii) state:

   > "Teaching assignments above three courses [nine credit hours] per semester, when combined with other faculty responsibilities, do not allow the time needed to develop and maintain a program of sustained scholarship."

Additional Actions Not Included in the Original Plan

4. I completed a research article titled "A Division Algorithm Approach to p-Adic Sylvester Expansions". This was published in the Journal of Number Theory, Vol. 160 (August 2015). A copy of the manuscript can be found in Appendix C.

5. In addition to learning how to use WeBWorK in my classes, I also created numerous problems. Once properly prepared, these problems will be submitted to the WeBWorK Open Problem Library to be disseminated and available to anyone using WeBWorK.

CRITERION 3: Evidence of continuing preparation and study

GOALS:

1. I plan to continue attending regional and/or national conferences.

   Outcome(s): I have attended the following conferences during this period:

   - MAA-NCS Spring Meeting, St. Cloud, MN, April 2014
   - MAA-NCS Spring Meeting, Winona, MN, April 2015
   - MAA-AMS Joint Mathematics Meetings, Seattle, WA, January 2016
   - MAA-NCS Spring Meeting, St. Paul, MN, April 2016
   - MAA-NCS Fall Meeting, Minneapolis, MN, October 2016

2. I plan to continue reading articles in mathematics journals and online.

   Outcome(s): For the research projects mentioned above, I have read uncountable research papers. In addition, I have subscriptions to three monthly or bi-monthly mathematics journals that provide and endless stream of interesting topics.

3. I plan on continuing to participate in online mathematical research forums.

   Outcome(s): During this period I have been actively participating in two online forums: MathOverflow.net, which is primarily aimed at research-level discussions, and MathEducators.stackexchange.com, which is intended for discussions about teaching mathematics and related pedagogy. Both have been very beneficial to my continued growth both an educator and a researcher.

4. I plan on attending relevant seminars sponsored by the department, university, and surrounding universities.

   Outcome(s): Over the last four years I have attended department seminars, colloquia, and other talks on most occasions. It has been beneficial learning from our outside speakers, seeing what our students have been researching, and becoming informed about the needs of industry.

5. I plan on being a reviewer for Mathematical Reviews (MR), a division of the American Mathematical Society (AMS).

   Outcome(s): I have been performing this service for the AMS as often as they request. In total I have had 7 reviews published to the AMS's online catalog MathSciNet and am currently working on another. I have benefited in reviewing these articles in my field of research that I otherwise might not have been aware of (as they are typically for articles in lesser-tier journals).

6. I plan on participating in Advanced Placement grading for Calculus.

   Outcome(s): I have been an AP Calculus Reader [i.e. grader] during June of 2013, 2014, 2015, and 2016 in Kansas City, MO. It has been extremely beneficial to meet and discuss with other Calculus instructors (both college-level and high school) from across the country. Some of these discussions have led to new activities and approaches in the classroom.

Additional Actions Not Included in the Original Plan

7. I submitted two solutions to problems posed in publications of the MAA. While these are not research level questions, these problems are still a challenge and a great way to practice problem-solving and mathematical writing skills. Details can be found in Appendix D.

CRITERION 4: Contribution to student growth and development

GOALS:

1. I plan to continue to coach the WSU math competition team.

   Outcome(s): In Fall 2012 we had 18 students compete in the MAA-NCS Team Contest and 12 students compete in the W.L. Putnam Competition. In preparation for these competitions, I held weekly practices. However, in Fall 2013, I was unable to recruit many students to compete. As such I have since handed this off to a junior faculty member in our department in the hopes that he has a better connection with the students. I continue to serve in an advisory role.

2. I plan to continue mentoring students in research.

   Outcome(s): See outcomes in (Crit 2, 1.)

3. I plan on taking students to regional conferences as appropriate.

   Outcome(s): I was unable to take students to conferences during this period.

4. I plan on continuing to take students on annual visits of regional graduate schools.

   Outcome(s): Chris Malone and I have taken groups of 7-10 students to four regional universities during the last four years: University of Nebraska, University of Minnesota, Iowa State University, and University of Iowa. These trips have been beneficial to students discerning their options after graduation and have, in multiple cases, resulted in a student applying and being accepted to graduate school at one of these universities.

5. I plan on making myself available to advise students and write letters of recommendation.

   Outcome(s): I have advised a total of 16 students over the last 4 years. I have met each semester with each of them in preparation for the next term and to discuss graduation plans. In addition, I have written letters of recommendations for 10 students applying to internships and/or graduate schools.

CRITERION 5: Service to the university and community

GOALS:

1. I plan on serving on the following departmental committees:
    a. MATH Subgroup Committee (Chair)

    Outcome(s): I have been serving as chair of this committee since Fall 2012. In AY2012-13 our committee updated the MATH curriculum with a course numbering scheme to be more consistent with MnSCU, we created clearer advising materials for our majors and minors, and updated course outlines.

    In AY2013-14 we developed the framework for MATH395 (Professional Skills in Mathematics) and MATH495 (Communication of Independent Project), which started running in Spring 2015. Also the committee revisited the requirements for our Math Education majors and, in response to deficiencies there and in other service areas, created two new courses, MATH117 and MATH247.

    In AY2014-15 our group worked on renewing Writing Intensives, completing paperwork for new courses, revamping our honors program, creating materials for the department webpage, and began fixing some MnSCU transfer issues.

    In AY2015-16 this committee worked with the physics department to create a new upper-level course to serve their majors and our MATH majors, we reviewed MnSCU transfer equivalent MATH courses to verify they were correctly matched, we worked on strategies to lower the cost to students through open-source texts and free online homework systems, we restructured the systematic offering of our upper-level electives and required courses to better serve students who declare the major during their junior year, we compiled information about our program's alumni to be used in recruiting materials, and we began the monumental step toward gathering program data for assessment purposes.

    b. Student Opportunities and Social Activities Committee.

    Outcome(s): I served on this committee from Fall 2012 until Spring 2016. This committee is in charge of overseeing department scholarships, student travel to conferences, graduate schools, and industry tours, and organizing social events for alumni and current students. This committee serves an especially important role for our department's relation with past, current, and future students.

    c. Communications Committee.

    Outcome(s): My main duties on this committee have come in the way of revamping the departmental webpage. Communicating and working with the web services office on campus has been frustrating and time-consuming, but in

the end our departments webpage has finally been modernized and will continue to improve.

Additional Departmental Committees Not Included in the Original Plan

d. I served on the Statistics Search Committee that started in Spring 2013 to hire a new statistician. This search stretched into Winter Break 2013-14 but was ultimately successful in hiring Dr. Silas Bergen.

e. I have been serving on the Seminar, Library, and Colloquium committee AY2013-14 and AY2015-16. The main function of this committee is to facilitate the process of bringing in outside speakers.

f. During AY2014-15 I served as chair of the Local Planning Committee for hosting the MAA regional conference which took place at WSU in Spring 2015. This involved securing funding from various sources and coordinating multiple logistical components. The event was very successful.

g. I served on our department's Fixed Term Search Committee in AY2015-16. This committee successfully filled three fixed-term positions in the department.

2. I plan commenting on the PDPs and PDRs of tenure-track and fixed-term faculty in Mathematics.

   Outcome(s): I have been providing written feedback to our probationary faculty in Mathematics and to our department's fixed-term faculty in Mathematics. I find it beneficial to know what my colleagues are doing and they have communicated to me that my comments are appreciated. During AY2014-15, our department decided to create a mechanism for PDP and PDR reviews within our department. As a part of this, I have been on the unofficial review panel for Lee Windsperger and Silas Bergen. As such I will be providing them with comments and feedback on their professional plans and reports. I also continue to do the same for the fixed-terms in our department with math PhDs as time allows.

3. I plan on being a reviewer for Mathematical Reviews (MR), a division of the American Mathematical Society (AMS).

   Outcome(s): See outcomes in (Crit 3, 5.)**.**

4. I plan on participating in Advanced Placement grading for Calculus.

   Outcome(s): See outcomes in (Crit 3, 6.).

5. I plan on serving on the university Grade Appeal Committee.

   Outcome(s): I have served on this committee since AY2012-13. In addition to hearing student appeals, I participated in this committee's efforts to update the university's policy regarding grades and the grade appeal process.

6. I plan on volunteering to serve on the city of Winona's Human Rights Commission.

   Outcome(s): I served on this committee until my term expired in September 2013.

7. I plan on continuing to be a volunteer for the Annual Southeastern Minnesota and Western Wisconsin Regional Science Fair.

   Outcome(s): For the last four years I have been in charge of Display & Safety at the science fair.

8. I plan on serving as a coach for the Cotter High School Math Team.

   Outcome(s): I coached the Cotter team throughout their 5 month season during for the last four years. The team's efforts have culminated in finishing in the top 3 teams in season total and competing at state each year.

Additional Professional Service Not Included in the Original Plan

9. I served on the North Central Section MAA Governor's Selection committee to create a list of potential nominees for the section.
10. In Spring 2016 I was elected to a two-year term as a Member-At-Large Officer of the North Central Section of the MAA.
11. I provided consultation for the book "Learning Qlikview Data Visualization" by Karl Pover.

Appendix A: New Course Materials

A.1: Math140 Notes/Slides

- A pdf version of the note slides can be found at: http://course1.winona.edu/eerrthum/Reports/FullNotesPrinterFriendly.pdf

A.2: Math242 Course Materials

- A collection of sample classroom activities can be found at: http://course1.winona.edu/eerrthum/Reports/Math242Activities.pdf
- A collection of sample classroom assessments can be found at: http://course1.winona.edu/eerrthum/Reports/Math242Assessments.pdf

A.3: Math247 Course Materials

- A collection of sample classroom assessments can be found at: http://course1.winona.edu/eerrthum/Reports/Math247Assessments.pdf

A.4: Math327 Course Materials

- The inquiry-based document used for homework and mathematical content can be found at: http://course1.winona.edu/eerrthum/Reports/Math327Materials.pdf

A.5: Math395 Course Materials

- A collection of sample classroom materials can be found at: http://course1.winona.edu/eerrthum/Reports/Math395Materials.pdf

A.6: Course Schedules and Syllabi

- A complete collection of course schedules and syllabi for all courses I have taught can be found at: http://course1.winona.edu/eerrthum/PreviousSemesters.htm

Appendix B: Student Evaluations

CONTENTS

(Note: Raw data of student evaluations available upon request.)

Appendix C: Scholarly Achievements

C.1. "A Division Algorithm Approach to *p*-Adic Sylvester Expansion", Journal of Number Theory, **160** (August 2015)

C.2. Slides for my presentation "Publish or Perish in an Intro to Proofs Course" given at the Joint Mathematical meetings in Seattle, WA in January 2016.

C.3. Slides for my presentation "Addition with Carries" given at the MAA-NCS Spring Meeting in St. Paul, MN in April 2016.

Appendix D: Evidence of continuing preparation and study

C.1. Solution to American Mathematical Monthly, Problem 11853, (Vol 122, No 7, Aug-Sept 2015).

C.2. Solution to College Mathematics Journal, Problem 1069, (Vol 47, No 1, Jan 2016).