Mathematics Department 2008-2009 Annual Report

I. Executive Summary succinctly highlighting programming activities/experiences (good/bad).

The Mathematics Department was able to implement the curricular changes approved during the 2007 – 2008 academic year. This increased the majority of classes for mathematics majors from 3 credits to 4 credits. This allowed deeper coverage in the courses offered in the past. This should also allow students to avoid taking three math classes in a quarter, which will allow them to be able to focus their minds on fewer topics.

The Mathematics Department was able to hire a new tenure-track faculty member, Mary Beisiegel of the University of Alberta. She is replacing the position vacated by Maria Fung, who left to teach at Worcester State College. Dr. Beisiegel will primarily teach courses in statistics and for pre-service elementary teachers, as this is her specialty. She will begin this position in the fall.

College Algebra, MTH 111, was once again taught primarily by the tenure-track members of the department. With the switch of emphasis to modeling, the department has noticed the material in the course to be more appropriate for students pursuing other majors. Because the textbook is out of date, and the textbooks were falling apart, the Mathematics Department has once again chosen a new textbook. With this new textbook, students will be able to have online homework which allows more immediate feedback. The department feels this will be a great benefit to their learning. The online homework was tested this past summer, by Klay Kruczek's summer MTH 111 class. Because of the belief students need immediate feedback on their work, the department plans to implement online homework in MTH 70, MTH 95, MTH 111, MTH 112 and the calculus sequence during this upcoming academic year.

Eight of the Mathematics Department students gave presentations at the Academic Excellence Showcase in 2009. There were also four posters by twelve students in the same event.

The Mathematics Department works closely with the Advising office, Registrar, DEP, and SEP to gauge the need for extra sections of remedial math courses. The department and the respective offices think we have finally reached the appropriate number of sections in these courses, as they seem to be filling up just as the quarter begins.

II. Section summarizing enrollment trends in the various programs and note what obstacles or opportunities the program faculty believes the administration should be aware of (i.e.., an abbreviated SWOT analysis of enrollment in the program).

In the Mathematics Department, the courses serve four types of clientele: our courses for mathematics majors, the service courses (mostly MTH 70, MTH 95, MTH 105 and MTH 111) satisfy the general population; MTH 211 – 213 and MTH 396 serve preservice K – 8 teachers, and MTH 392 – MTH 398 and MTH 492 – 495 are for preservice K – 8 teachers wishing to teach mathematics. The hope is students do not delay taking mathematics courses until their junior or senior years. All this does is make the situation worse for those who fear mathematics.

The number of students pursuing a mathematics major has remained steady in the mid-30's over the past few years. With the result of the credit switch (from three to four credit) of upper level mathematics courses, students have gone from needing 6 electives to graduate to needing only 4 electives. An unexpected outcome of this switch (which actually should have been expected) is a reduction in the number of upper division electives that can be offered each quarter. The department canceled an elective each quarter during the 2008 – 2009 academic year. This reduction will allow the department to reallocate its resources to help with cover issues with other enrollment trends.

There has been a significant increase over the years of students in the general service courses. Because of this and the desire for students to take mathematics their freshman or sophomore year, the number of sections of MTH 70, MTH 95, and MTH 111 has increased greatly in the past couple of years. It seems that, finally, the correct number of sections of each course is being offered each quarter. As a result of changes in degree requirements for students in the natural sciences, the enrollment in the calculus sequence has increased as well. This has not quite been handled completely yet. With the reallocation of resources due to the reduction of upper division mathematics electives offered, the department plans to offer two sections of MTH 251 in the fall of 2010. We also do not know what the effect of the nursing program will be on the enrollment in MTH 243. So far, there has not been an impact, but Jean Donovan, assistant professor of nursing for OHSU, would like to offer another section of MTH 243 in the fall designed for the nursing students. The Mathematics Department and the nursing program are working out the details of this. Again, offering less upper division mathematics electives will allow the department to cover this extra section.

The enrollment in the introductory mathematics courses for preservice K-8 teachers has been steady. The department continually encourages students who excel in the foundations sequence (MTH 211 – 213) to pursue a focus in mathematics, as the world can always use more qualified and enthusiastic

mathematics teachers in the classroom. This push has increased the numbers in the courses specifically designed for middle school teachers.

III. Section summarizing activities related to program review and assessment.

For the past three springs, the graduating mathematics majors have been given both an exit interview and (at least a partial version of) the Mathematics Major Field Test (MFT), put out by ETS. The exit interview's questions focus on student involvement in activities and program involving mathematics both inside and outside the department, plans after graduation, advising (academically and for a career path), and comparing their experience to their friends' experiences in other departments. The department plans to compile the data in the future.

The results from the 2009 MFT are heartening. The mathematics majors finished in the 95th percentile in the nation. The math majors have always been good students, as evident by their participation in local conferences and their attendance in graduate school, but to finish that high was really surprising.
Although the department certainly aspires to higher mean percentages in the assessment indicators, they are very pleased with the national percentiles. The results show, at least, that the WOU Mathematics Department is very effective compared with mathematics departments nationwide.

The department first administered the full Mathematics Major Field Test (MFT) in 2008. The students took it very near the end of spring term in the afternoon of a school day. The test score did not count toward any grade. In 2009, the students took the exam on the third Saturday of spring term. The test score counted for 10% of the grade in MTH 403 (Senior Project). The use and significance of the test were explained. Sample questions from the MFT and from the Mathematics GRE were available to use as practice problems. Some students organized study sessions and most students participated in one or more sessions.

The department conjectures that the 2008 students simply did not take the test very seriously, since the class of 2008 and the class of 2009 were very comparable. The hope is the 2009 is a more accurate assessment of the program. Obviously, more data is needed.

Michael Ward supervised the Senior Project (MTH 403) last year. This course includes writing a capstone paper, which in most cases would be an expository paper based on a published mathematics paper. The students in this course also present their papers in two one-hour lectures to their fellow classmates and the rest of the department. Many of our sophomores and juniors and faculty attend these presentations. These presentations are video taped and archived as part of the mathematics department assessment plan. They also present a summary of their paper at the Academic Excellence Showcase. Copies of the rubric for senior paper and presentations are available upon request. Each year, the faculty who

is in charge of Senior Project (MTH 403) is also responsible for archiving the documentation.

The Mathematics Department has an embedded assessment plan in place. Each faculty carries out parts of the plan relevant to his/her department teaching and assignments (archiving samples of student writing and exams, conducting exit interviews, etc.) During the fall, the department will compile the data from the spring. Copies of embedded assessment ideas acquired during the spring were sent over in June.

IV. Section describing division-wide conversations, programming or initiatives.

V. Any other issue(s) you wish to bring particular attention to.

The main issue the Mathematics Department is running into is the lack of office and classroom space. The non-tenure-track faculty offices in MNB are very small, and two of the NTTFs in the department will be sharing an office next year. This is not an ideal situation. Classroom space is also an issue, as it is across campus. The department has begun to schedule more classes at 4p.m., but we struggle finding faculty members willing to teach later than this. One more office and one more classroom would solve all of the space issues encountered by the department. The Mathematics Department understands they have no right to complain because, after all, they have their own building, but the classroom space issue is getting worse with the ever increasing number of students in the university, especially those requiring remedial mathematics courses.

VI. Appendices for notable faculty engagement in:

A. Teaching – include out of the ordinary type notations, only, such as faculty-student collaborative scholarship, attendance with students at conferences, service learning components, etc.

In the Advanced Calculus sequence (MTH 311/ MTH 312), Scott Beaver has restructured the entire course, based on the pedagogical style of R.L. Moore. He presents a list of definitions and theorems, and the students prove the theorems, with minimal to no help from him.

Cheryl Beaver worked with undergraduate mathematics major Matthew Schmidgall on Rubik's Cube ciphers.

Mike Ward worked with senior mathematics majors on their research projects in MTH 403 (Senior Project). Although a portion of the project does not involve original research, there usually is some part of the senior project where students perform original research.

Mike Ward, Scott Beaver, Cheryl Beaver, and Klay Kruczek attended the annual meeting of the Pacific Northwest Section of the Mathematical Association of America (MAA) (in Ellensburg, WA during April 2009) with six mathematics majors (Kristal Temple, Matthew Schmidgall, Jenne Elston, Wesley Parker, Michael Rivers, and Masaki Ikeda). Five of these students also presented a talk at the conference.

Cheryl Beaver and Laurie Burton, with the support of Scott Beaver, Klay Kruczek, and Mike Ward, organized the Fifth Annual Sonia Kovalevsky Day in February of 2009. The above mentioned faculty and several of the Mathematics Department students participated in the activities for that day. Sonia Kovalevsky Day is a program of hands-on workshops, talks and a problem-solving contest for high school women students and their teachers, both women and men. The purpose of the day is to encourage young women to continue their study of mathematics and to assist the teachers of women mathematics students.

Cheryl Beaver and Klay Kruczek, along with members of the Biology Department, made a presentation at New Student Week entitled How to Succeed in Mathematics and Science.

B. Scholarship – professional and/or peer-reviewed

Publications:

Cheryl Beaver, Laurie Burton, Klay Kruczek and Maria Fung (Worcester State College)

MAA Notes Volume

Based on work offering and leading sessions on the mathematical education of middle school mathematics teachers, the Mathematics Association of America invited us (C. Beaver, Burton, Fung and Kruczek) to submit a proposal to compile and edit a collection of articles and resources, "*Programs, Courses and Resources for Training Preservice Middle School Mathematics Teachers"* as a volume in the MAA Notes Series. Our proposal has been accepted and we have in the midst of our work editing papers as editors of this MAA Notes book.

Cheryl Beaver:

"Cryptology in the Classroom: Analyzing a Zero-Knowledge Protocol", Cryptologia, Vol.33, pp.16-23, January 2009.

Scott Beaver:

"Advanced Calculus I and II Tailored for Two Ten-Week Terms," *The Journal of Inquiry-Based Learning in Mathematics*

"A Weighted Wiener's Lemma for Integral Operators With Schur-Type or Essential-Supremum Kernel Decay Conditions," *The Houston Journal of Mathematics*

"A Pre-Bridge Course: The Natural Role of Sequences and Series," *PRIMUS (Problems, Resources, and Issues in Mathematics Undergraduate Studies)*

Hamid Behmard:

Submitted a paper to the journal of IEEE Transactions on Signal Processing with the title "Efficient Reconstruction Algorithms Using Shifted Lattices". The paper has been accepted and will be published in short future.

Laurie Burton:

"Visual Algebra for College Students", student book and instructor materials.
Materials now being disseminated with the help of the Math Learning Center (Salem, Oregon).

"Mathematics for Elementary Teachers: A Conceptual Approach", eighth edition
New co-author, January 2010, McGraw Hill

"Mathematics for Elementary Teachers: An Activity Approach", eighth edition
Continuing co-author, January 2010, McGraw Hill

Klay Kruczek

A Pairing Strategy for Tic-Tac-Toe on the Integer Lattice with Numerous Directions, *The Electronic Journal of Combinatorics*, 15(1), 2008. (co-author Eric Sundberg)

Submitted a paper to the Electronic Journal of Combinatorics entitled "Potential-Based Strategies for Tic-Tac-Toe on the Integer Lattice with Numerous Directions". (co-author Eric Sundberg)

Mike Ward

Research with L. C. Kappe, G. Mendoza, and M. Mazur, Binghamton University, "On some minimality conditions involving elements of prime order in a group." Manuscript for publication in preparation.

Joint research with Jen Carmichael ’06 and Keith Schloeman ’07 on Cayley-Sudoku Tables. Manuscript submitted for publication. Recently accepted, with very positive reviews from two referees and the editor, subject to some revision which is in progress.)

Presentations:

Cheryl Beaver:

“Common error patterns in pre-service teachers’ attempts at writing fraction word problems.”

Annual Meeting of the Pacific Northwest Section of the MAA, Central Washington University, April 2009

Scott Beaver:

March 2009, “An Optimal, Democratic Orthogonalization Technique from the Singular Value Decomposition,” Humboldt State University Mathematics Colloquium, Arcata

Faculty Mentor: “Pop Bottle Symphony” Sonia Kovalevsky Mathematics Day for High School Girls, Western Oregon University, Oregon, 2009

Hamid Behmard

“An Efficient Reconstruction Method for Band-Limited Images Using Nonperiodic Sampling Sets”, SIAM Conference on Imaging Science in July of 2008.

Laurie Burton

“Fraction Bar Fun,” Northwest Mathematics Conference, Portland, Oregon, October 2008

Faculty mentor: "Puzzles Session" Sonia Kovalevsky Mathematics Day for High School Girls, Western Oregon University, Oregon, 2009

Klay Kruczek

“Birds, Trees, and Tic-Tac-Toe”, Northwest Mathematics Conference, Portland, OR, October 2008

Faculty Mentor: “Who Wants to be a Math Millionaire” Sonia Kovalevsky Mathematics Day for High School Girls, Western Oregon University, Oregon, 2009

Mike Ward:

“Introduction to Proofs Class: Content and Effectiveness”

Annual Meeting of the Pacific Northwest Section of the MAA, Central Washington University, April 2009 (Klay Kruczek presenting):

Faculty Mentor: "Fun with Origami" Sonia Kovalevsky Mathematics Day for High School Girls, Western Oregon University, Oregon, 2009

Grant Writing Activities

Cheryl Beaver, Laurie Burton, Klay Kruczek:

PREP Workshop on "Active Learning Approaches and Visual Methods for Teaching the Foundational Mathematics for Elementary Teachers Courses" Sponsored by the MAA. (Funding ~$20K)
(This was a week long course was given in July 2009. We had 17 participants from across the United States.)

Klay Kruczek

$500 WOU Foundation Grant funded for student travel to the Nebraska Conference for Undergraduate Women in Mathematics. (Money postponed until 2010 because of late notice of funding.)

Mike Ward:

$500 WOU Foundation Grant funded for student travel to academic conferences; will send approximately 9 students to two conferences

$500 Pi Mu Epsilon National Lectureship Grant funded; resulted in a very useful visit by a national PME board member

C. Service – include service to external organizations or student organizations; no need to list faculty senate or department/division-like service

Cheryl Beaver:

- Co-organizer for annual Sonia Kovalevsky Mathematics Day for High School girls
- Organizer of Mathematics poster session for WOU Academic Showcase
- Participated in "How to Succeed in Math and Science" during new student week
- Organized the session "Probability and Statistics for Non-Majors - Topics, Techniques, and Tips," at the PNW NExT Meeting, Central Washington University, Ellensburg, WA.
- Judge, Undergraduate poster session at the Regional PNW MAA conference
- Co-organizer for a session at the Regional PNW MAA conference

- President Elect for 2009-2010 Teachers of Teachers of Mathematics, Oregon

Scott Beaver

- Vice-President-elect, WOU Faculty Senate
- Treasurer, WOUFT (AFT-OR Local 2278)
- Member, WOUFT Collective Bargaining Team
- Marshal, WOU Commencement June 2009
- Faculty Advisor, William Lowell Putnam Math Competition Team
- Member, WOU First-Year Experience Committee
- Math Club Co-Advisor, Mathematics Department

Hamid Behmard

- Mathematics Department Chair 2008-2009
- Faculty Senate Awards committee 2008-2009
- Reviewer for IEEE Transactions on Signal Processing. (Reviewed three papers for the journal from the Spring through Fall of 2008.

Laurie Burton

- COMET: Member "Committee on the Mathematical Education of Teachers," Mathematical Association of America, 2004 – present
- Co-organizer for annual Sonia Kovalevsky Mathematics Day for High School girls

Klay Kruczek

- Faculty Member on Student Conduct Committee
- President, Oregon Mathematics Education Council, November 2008 – Present
- Communications Officer, Pacific Northwest NExT Section
- Co-organized the problem solving session (with mathematics major Kristal Temple) for Sonia Kovalevsky Day (February 2009)
- Organized session on "Introduction to Proofs Class: Content and Effectiveness" at the annual meeting of the Pacific Northwest Section NExT (Central Washington University, April 2009).

Mike Ward

- Pi Mu Epsilon (national math honor society) chapter advisor
- Co-organized a session on origami for Sonia Kovalevsky Day (February 2009)

D. Significant student successes – please add as much detail as possible; e.g., acceptance to graduate school, external award recipients, other student demographic data of note

Currently, three students who graduated this year with a degree in mathematics (Chris Mock, Andrew Nerz, Jenne Elston) and one from last year (Elizabeth Burke) have been accepted into the WOU MAT program.

Dania Morales (Math 2010) is attending the Carleton Summer Mathematics Program for Women. This is the second of our majors to go. Last year, Kristal Temple attended.

At the annual meeting of the PNW Section of the MAA at Central Washington University in April 2009, Matt Schmidgall (Math 2010) and Masaki Ikeda (Math 2009) won second and third place respectively for their student presentations.

Corel Goll (Math 2009) won "Best Short Talk" at the Northwest Undergraduate Mathematics Symposium at Oregon State University in May 2009

Laura Waight (Math 2010) received an Oregon Space Grant Consortium scholarship.
(June 9, 2009 revised template)

Kady Hossner and Richard Kavanagh (mathematics majors) attended the Texas A&M Pre-REU (Research Experience for Undergraduates) (June – July 2009)

Laura K. Waight, Matthew J. Schmidgall, Andrew C. Nerz, Dania A. Morales, Christopher L. Mock, Masaki Ikeda, and David E. Daniels were inducted into Pi Mu Epsilon, the national mathematics honor society.