DIVISION OF NATURAL SCIENCES AND MATHEMATICS
2011-2012 ANNUAL DEPARTMENTAL REPORT – MATHEMATICS
Compiled by Cheryl Beaver

I. EXECUTIVE SUMMARY

This has been a year of changes and opportunities in the mathematics department. We welcomed two new tenure line faculty members Breeann Flesch and Matthew Ciancetta, and Visiting Assistant Professor Matthew Nabity. All three have made significant contributions this year in their teaching and to the department. We saw seven mathematics major students graduate this spring and one computer science/mathematics major.

Our students continue to do outstanding work. All seven seniors presented their senior project work at the Pacific Northwest section meeting of the Mathematical Association of America. Two juniors gave talks at national conferences. Several students are attending prestigious summer REUs (Research Experience for Undergraduates).

Mathematics Department faculty continue to engage in scholarly research. This year saw 4 papers accepted to peer-reviewed journals and the publication of a new version of Laurie Burton's popular Mathematics for Elementary Teachers book. All tenure track faculty participated in some kind of presentation or poster at local or national conferences. Faculty also participate in national roles such as refereeing papers for journals and serving on national committees. Hamid Behmard is president-elect of the National Honor Society of Phi Kappa Phi.

The mathematics department welcomed Dr. Lin Lin, a visiting scholar from China. Lin Lin was studying the educational system in the United States. She observed many of our classes and gave several informative talks about Chinese education.

The Mathematics Department has seen growth in the students with a 15% increase in student contact hours from just two years ago. The growth has come naturally from service level courses as the size of the university increases and from an increase in students in the math major. Next year's graduating class of mathematics majors will be the largest yet.

The Mathematics Department remains committed to serving the needs of remedial and lower level mathematics students. Laurie Burton has been instrumental in establishing a regular drop in tutoring lab in the library. The lab is open daily and the number of students who use this resource grows every term. We also continue to work with SEP to offer Supplemental Instruction Tutors - a mathematics major who meets twice a week for one hour with the SEP students to help them understand the material in the courses, create better study habits, and adjust to college life more easily.

Mathematics Department faculty initiated a partnership with a local elementary school. The Math Buddies Program pairs students in MTH 396 (Problem Solving for elementary teachers) with 4^{th} and 5^{th} grade students at Ash Creek elementary school. Elementary students engage in problem solving activities that are mentored by their WOU Math Buddy. Elementary students' problem solving skills develop while WOU students learn about assessment and effective mentoring techniques from authentic student work. At the end of winter and spring terms the Ash Creek students (100 students) came to campus to meet their buddy and engage in some fun mathematics activities.

The Mathematics Department has been investigating ways to bring some of the service level classes online. An initial step in this direction is the development this summer by Matthew Nabity of a dual credit (HS/WOU) online DEP College Algebra course to serve high school students in rural Alaska. Matthew's work will serve as a model as we consider other courses that we can bring online to serve, for example, student populations who may take these courses elsewhere over the summer.

The Mathematics Faculty is involved in the governance of this university. We had representatives on the Faculty Senate, Faculty Development, Curriculum, Maurice Undergraduate Initiative Review, and University Accreditation committees. Scott Beaver served as Chief Bargaining Officer for faculty on the WOUFT and on the executive committee for PURE. Scott is also a SB 242 Oregon Retirement Plan Committee Member.

Finally, Sharon Price joined us as our new office coordinator. The amount of specialized information Sharon has mastered over the last year is remarkable. Sharon is the first person most people see when they walk in to the Math and Nursing Building. She is polite, respectful, helpful, and always acts professionally. In an environment where students often experience significant stress about their math classes, placement, or skills test, Sharon is a comforting presence. We are lucky to have Sharon as part of our department.

II. ENROLLMENT TRENDS

Enrollment in the service level courses (MTH 70, 95, 105, 111) remains high. We have kept up with enrollment by increasing class size and adding sections when needed. The mathematics department maintains careful records of student enrollment and schedules appropriately.

The upcoming graduating class of mathematics majors is the highest yet. Our upper division courses have been filling over the past two years. This brings with it a challenge with the senior project class. One of the strengths of our major is the senior project requirement. Students work with an advisor on a topic of their choosing and produce a paper and give talks on their work - usually at least one presentation is at a conference outside of WOU. It is a valuable research experience and develops their mathematical maturity and confidence. It has been a challenge for the instructor of the senior project course to manage all of the students, but with the 2013 graduating class being upwards of 20 (compared to 7 in 2012) we will need to add another section of the course to manage the work of the senior projects for the instructor. In addition all faculty will help advise students. It should be noted that this is not a regular part of the faculty load; the willingness of faculty to give of their time is a demonstration of our commitment to the students and to providing a high quality education.

2011-2012 saw a slight drop in the enrollment in the mathematics education service courses (MTH 211,212, 213). In response we canceled a section each term next year. As we look at enrollment data so far for Fall 2012, it appears that the trend might be reversing – both sections of MTH 211 are currently full for Fall. However, since we offer trailer sequences each term we are confident that students will not be held back and in the long term it will help even the load over the course of the year and maximize efficiency.

We offer two sections of MTH 243 each term. With the increased enrollment in MTH 243 due in part to the increase in pre-professional students we have noticed that both sections of 243 fill every term. We offered a section during summer term that also had significant enrollment. It may be useful to try to add a 3rd section of MTH 243 on a trial basis, but it is difficult to find instructors to teach the course drawing from our current pool. This is due to the fact that only one NTT currently teaches the course and our other TT faculty are needed to teach the upper division courses.

The enrollment in the MS in Ed program with a math focus has steadily decreased over the years. We are at the point where there are so few students in the program that courses are cancelled on a regular basis. This in turn discourages people from enrolling in the program. We are committed to try to reverse this trend by offering new courses with new hybrid delivery methods to accommodate inservice teacher schedules. This however takes time to develop that we do not have during the school year and so will take some careful planning and allocation of resources to implement.

If the upward trend of enrollment continues both in upper and lower division classes we may not be able to meet need without another full time faculty member.

III. SUMMARY OF PROGRAM CURRICULUM CHANGES

Please provide a BULLET summary of program curriculum changes that were initiated this past year. In your summary, provide a brief short title/description of the change, the status of the change (options: proposed, final approval pending, approved, in new catalog), and a list of program outcomes to which the change is linked.

The math curriculum changes were minimal. They were made to more accurately represent title, prerequisites, and content and so did not pertain to specific program outcomes. All have been approved:

- MTH 392,393,398 Title update to include middle school
- MTH 494/594 Description change
- Mth 411 Split into two 2 credit classes
- Mth 412 Split into two 2 credit classes
- MTH 70 Description change
- MTH 95 Description change
- MTH 111 Description change
- MTH 243 Description change to address prerequisite issues in banner
- Mth 404W Prerequisite change

IV. PROGRAM ASSESSMENT ACTIVITIES AND RESULTS

Provide a BULLET summary of program assessment activities and results from the past year, include evidence that the assessment activities are leading to the improvement of teaching and learning. Include Embedded Assessment Results, Other embedded approaches, and Exit and Proficiency Exams.

- **Major Field Test in Mathematics given to seniors:** Administering the Major Field Test, in mathematics has become part of the curriculum for students taking Senior Project (MTH 403 and MTH 404). We continue to be impressed by the student results. In the past, the seniors had finished in the 90^{th} percentile as a class. The math majors have always been good students, as evident by their participation in local conferences and their acceptance to graduate school, but to finish this high consistently is very impressive. The results show that the WOU Mathematics Department is very effective compared with mathematics departments nationwide.

- **Exit Interview for graduating seniors:** An exit interview is given to graduating seniors as well. The interviewer records the student's spoken answers to the questions below and saves them onto the network (the student's name is never recorded). 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 keeps answers to the exit interview questions (without names) electronically.

- **Senior Project:** Scott Beaver supervised the Senior Project I - II (MTH 403 and MTH 404) 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. 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 and at the Pacific Northwest regional

MAA meeting. Copies of the rubric for senior paper and presentations, the papers and videos are archived in an online folder.

- **Embedded Assessment**: The Mathematics Department spent significant time evaluating and revising the assessment plan according the new forms from the Dean. We decided that we service many sets of populations and that each curricula needs to be reviewed independently. This year we considered the mathematics major curriculum, the curriculum for the service course, and the curriculum taken by K-8 preservice teachers. We came up with separate plans for each assessment and will be archiving data from the embedded assessment of each in a folder on our electronic math drive. In the process of reviewing the learning outcomes and how they were assessed we identified some places for improvement or in need of revision that we will consider next year. Copies of these documents are included with this report in Appendix 2.

V. SWOT ANALYSIS

a. Strengths *(Key words: capabilities, resources, assets, marketing, innovative aspects, value, quality)*

- The high quality of Mathematics faculty is evidenced by their teaching evaluations, publication records and leadership roles in local and national organizations.

- The Mathematics Department has a strong commitment to undergraduate education. Smaller class size, one-on-one advising of senior projects, and easy accessibility of faculty to students are some examples of contributing factors to the high quality education we provide.

- The success of the program is demonstrated in part by the success of our students.
    - Mathematics students have been successful in gaining admittance to competitive summer research programs (REUs).
    - Students regularly attend both local and national conferences and present work (some win awards).
    - Students regularly score high as a group on the Major Field Test.
    - Students regularly earn positions teaching, in industry, or in graduate school upon graduation.

- The mathematics preparation of pre-service K – 8 teachers at Western has been recognized by the National Council on Teacher Quality.

- The department employs innovative teaching strategies both in the education and major courses. Examples include discovery-based learning, hands-on group work and use of technology.

- The department is committed to self assessment and is always looking for ways to inform our teaching and improve the quality of our education.

- Mathematics faculty play a role in the service to the larger campus community serving on a variety of committees and in leadership roles.

- The Mathematics department is committed to improving student achievement in all level of courses. Faculty have been instrumental in establishing a drop in tutoring center in the library to help facilitate student success.

b. Opportunities *(Key words: market developments, industry trends, nice markets, innovation, partnerships)*

- Faculty members have been increasingly engaged in collaborative projects that will create new opportunities. Matthew Ciancetta is beginning work on a grant with other WOU faculty involving Talmadge Middle School and Cheryl Beaver will be on an advisory board for a STEM Center being developed by the Oregon Aquarium through an MSP grant.

- Matthew Nabity is developing an online course offering for a dual credit (HS/WOU) College Algebra class for students in Alaska. The market for such offerings is strong and we look forward to working with DEP to develop more such classes. We also plan to use Matthew's work as a model to develop online offerings for other classes. There is a demand for such offerings over the summer for the population of students who leave campus and tend to take classes elsewhere.

- Cheryl Beaver has been working with a state Mathematics Specialist Task for to help establish a Mathematics Specialization for a teaching license. This proposal is being reviewed by the Teachers Standards and Practices Commission and a vote will be taken in November. If passed, this gives us the opportunity to develop a program and degree path in conjunction with the College of Education to provide a means of achieving this specialization.

- As we consider alternate delivery methods for courses, we see an opportunity to increase enrollment in the mathematics courses in the MS in Ed program by offering math education content courses in a hybrid fashion. We believe this will better cater to the schedule demands of inservice teachers who are the market for such courses and as a result increase enrollment. It will take resources to develop and revise our courses to accommodate the hybrid delivery model.

- Retention and remediation of low level mathematics students is both a challenge and an opportunity. We continually look for ways to help this struggling population.

c. Challenges *(Key words: market demand, sustainability, obstacles, weaknesses)*

- As we move forward to act on our opportunities a constant obstacle is lack of manpower. In an already tight schedule, if we wish to develop and sustain new courses we need another tenure line faculty member. If our visiting assistant professor (who has taken on the development of online offerings) were to leave, the online development would come to a halt.
- In the past few years the numbers of students in MTH 70 and MTH 95 has continued to grow. We have further noticed a need for mathematics remediation below the level of MTH 70. Addressing this issue so that all students can succeed is a major challenge.

- As the university continues to grow and the number of course offerings increase it has become an increasing challenge to find office and classroom space.
- In spite of limited time for the immersion required by mathematical research, we have worked hard as a department to stay active in our specific areas, but this is always a challenge.

d. Vulnerabilities (*Key words: gaps in capabilities, financials, cash flow, supply chain, disadvantages)*

- We currently lack a tenure-track member of the department who can teach the statistics courses needed for a student to go into actuarial sciences or graduate school in statistics. That is a major weakness. Such a person would open the doors for new degree tracks or perhaps an applied baccalaureate in actuarial sciences.
- The online and hybrid delivery course development presents a lot of opportunities; however, the lead on that is the visiting assistant professor if he leaves for a more permanent position our development stops.
- As the number of classes increase, the classroom space and office space is becoming scarce. If we are unable to support the demand, students will fall behind in their ability to complete their graduation requirements on time.
- The number of mathematics majors is currently in a steep upward trend. Upper division classes are filling up like never before and we are having trouble staffing all the courses that we need. This gap together with the work that would be required if we take on new opportunities would be filled by a new tenure-track person.

VI. PROGRAM PLANNING AND INITIATIVES

Please provide a BULLET summary of any program plans or development initiatives that are in the works.

- Matthew Nabity is at work developing an online MTH 111 course to be offered through DEP as dual HS/WOU credit to a population in Alaska. He will develop MTH 112 for the same audience in the fall for a spring offering. This has potential to be expanded to include other high school populations outside of Alaska. Matthew's work will provide a model for other online classes the math department may offer. There is a particular need we could fill for the service courses MTH 70,95,111, and 243 – students tend to take these classes elsewhere during the summer because they are not on campus. If we had online versions offered over the summer for example, we could tap into this population.
- The mathematics education faculty in the mathematics department have been thinking about offering some of our 500 level classes using a hybrid delivery. Enrollment has steadily been decreasing over the years and we feel that offering the courses in a hybrid manner would attract more inservice teachers. The challenge is finding time and resources to revise the content to be suitable for such an environment.
- Scott Beaver was part of a task force to look at the possibility of a pre-engineering program at WOU. Although an interesting idea, it would require at least 1-2 more faculty members to handle the new classes that would need to be offered. This is not currently in the works.

VII. OTHER ITEMS

VIII. PUBLIC RELATIONS ITEMS FOR PROGRAM PROMOTION

List any notable faculty, student, or program accomplishments that you would like to showcase in public relations outreach.

- **Sonia Kovalevsky Day**: The Math Dept sponsored its 7th annual Sonia Kovalevsky Day this past February. SK Day is a program of hands-on workshops and talks 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.

- **Major Field Test**: The mathematics majors continue to do very well on this exam.
- **Undergraduates in Mathematics Scholarship Winners 2011 - 2012**

  Ernie and LaVerne Cummins Scholarship: Lyubov Belobrovchuk
  Charlie Dolezal Scholarship: Anna Kralovec and Rosanna Mercereau

- **Research Experiences for Undergraduates (REUs) 2012**
  The following students were accepted to REU's: Ariel Setniker at UW Stout, Madelyn Twain at Texas A&M, Cassy Hanson at Texas A&M, James Dolciamore at Texas A&M, and Molly Stubblefield at MSRI-UP. Molly was also accepted to the Budapest Semesters in Mathematics for Fall 2012.

- **Conferences 2011-2012**
  - Ariel Setniker attended the 2011 MAA-MathFest in Kentucky and presented her results from the REU she attended at Michigan State in 2011, "Inverse Modeling of Dynamical Systems".
  - Heather Johnston attended the 2012 Joint MAA/AMS Meeting in Boston where she presented the research from her Summer 2011 Texas REU at a talk entitled "Oregon Blackberry Invasion Analyzed by Spatial Stochastic Modeling".
  - Ariel Setniker attended the 2012 Joint MAA/AMS Meeting in Boston where she presented the research from her Summer 2011Michigan State REU in a poster entitled "Inverse Modeling of Dynamical Systems".
  - Ariel Setniker and Molly Stubblefield attended the Nebraska Conference for Undergraduate Women in January 2012.
  - Matt Bruck, Jamie Gilman, Kelli Zehr, Heather Johnston, Keenan Kriegel, and Brittney Rigtrup presented their Senior Projects at the April 2012 PNW-MAA Conference at the University of Portland.
- **Problem solving partnership with local elementary school**
  Winter and spring terms, the Mathematics 396 "Problem Solving" classes have been piloting a "Math Buddy" project with about 100 fourth and fifth graders at the local *Ash Creek Elementary School*. Winter term ended with a big "Pi Day--Meet your Math Buddy" event on 3/14/2012. Pi Day was very exciting for everyone (kids and WOU students alike). This WOU Spotlight has some nice pictures of the winter event!

- **Laurie Burton** is the co-author for the ninth edition of the **Mathematics for Elementary Teachers: A Conceptual Approach** textbook and the ninth edition of the **Mathematics for Elementary Teachers: Activity Approach** workbook published by McGraw Hill January 2012.

APPENDIX 1. FACULTY AND STUDENT ACCOMPLISHMENTS

Provide bullet line items related to individual faculty and student achievements.

I. FACULTY AND STAFF ROSTER

Cathy Aune	Non-tenure-track faculty member
Cheryl Beaver	Associate Professor
Scott Beaver	Associate Professor
Hamid Behmard	Professor
Laurie Burton	Professor
Matthew Ciancetta	Assistant Professor
Avery Cotton	Non-tenure-track faculty member
Breeann Flesch	Assistant Professor
Stanley Leung	Non-tenure-track faculty member
Chris Mock	Non-tenure track faculty member
Andrew Nerz	Non-tenure-track faculty member
Matthew Nabity	Visiting Assistant Professor
Sharon Price	Office Coordinator
Dennis Spencer	Non-tenure-track faculty member
Mike Ward	Professor
Ron Wiebe	Non-tenure-track faculty member

II. FACULTY HIGHLIGHTS

a. Teaching

- Scott Beaver worked with senior mathematics majors on their research projects in MTH 403 and MTH 404 (Senior Project I-II). 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.
- Laurie Burton, Matthew Ciancetta, Breeann Flesch, and Cheryl Beaver implemented the Math Buddy program with students in MTH 396. The program pairs WOU students with buddies in 4th and 5th grade at the local elementary school. This model required significant changes in the course and coordination with the school teachers. Each term culminated in a field trip to campus for the approximately 100 4th and 5th graders. The event was a significant undertaking for the course professors.
- Laurie Burton and Cheryl Beaver worked with students on their mathematics education capstone. The students did significant work in research and lesson planning. As with the senior project students, these students wrote papers and gave presentations on their work.
- MTH 211,212,213 added an online assessment component. Instructors Aune, Burton, Beaver, Ciancetta, Flesch and Weibe had to learn and incorporate the system into their courses.
- Scott Beaver implemented a new paradigm in his Mth 416 course: He “flipped” the course, meaning that he recorded (what amounts to) lectures, which the students watch outside of class, and essentially held in-class office hours. The video recordings have been posted to his website and WOU.TV, and he has also used LiveScribe PenCast technology (see his website for examples). The course was self-paced, and he presented a summary of the efficacy of this approach at the 15th Annual Legacy of RL Moore Conference in Austin, TX in June 2012.
- Several instructors updated course packs, created labs, added more illustrative examples, and added technology to their teaching. Faculty are always looking for ways to improve classroom learning.
- Laurie Burton was instrumental in setting up a drop-in tutoring lab in the library. This lab has served numerous students and is a part of the culture of student learning. Instructors of MTH 70,95,105,111 were committed to helping make the tutoring lab a success.

b. Scholarship

Peer Reviewed Papers

"Mathematics for Elementary Teachers: A Conceptual Approach" and "Mathematics for Elementary Teachers: An Activity Approach" Bennett, **Burton** and Nelson, ninth edition, McGraw Hill, January 2012.

Ferrara, Michael; **Flesch**, Breeann; Gethner, Ellen. List-distinguishing colorings of graphs. *The Electronic Journal of Combinatorics* 18 (2011), P161, 17pp.

Cheryl Beaver & Stuart Boersma: KRYPTOS: A Pacific Northwest Cryptanalysis Contest for Undergraduates, *Cryptologia*, 36:2, 149-156 (2012).

Beaver, Cheryl; Beaver, Scott: The Effect of Peer-Assessment on the Attitudes of Pre-Service Elementary and Middle School Teachers about Writing and Assessing Mathematics, *IUMPST: The Journal. Vol 5 (Teacher Attributes)*, December 2011 [www.k-12prep.math.ttu.edu] .

McAllister, Cheryl; **Beaver Cheryl** : Identification of Error Types in Preservice Teachers' Attempts to Create Fraction Story Problems for Specified Operations, *School Science and Mathematics*, Vol 112, Issue 2, p.88-98, (2012).

Presentations

Cheryl Beaver: Panelist "How to Get Tenure and Survive " 2012 PNW Section NExT component of the PNW MAA conference ; University of Portland, Portland, OR

Cheryl Beaver: "Elementary Math Specialist Update", presentation at TOTOM , Portland Community College, September 2012.

Scott Beaver: "Reflections on a Self-Paced Complex Analysis Course" (to be) given at the 15th Annual Legacy of RL Moore Conference in Austin, TX on June 15, 2012.

Hamid Behmard: Presented at the MAA regional conference at Juneau Alaska, titled "Advantages and disadvantages of using web based assessment software in mathematics classes"

Laurie Burton: Panelist *for Small Group Discussions in Math Class* at 2012 PNW Section NExT component of the PNW MAA conference University of Portland, Portland, OR April, 2012

Matthew Ciancetta: Hackett, R. K., Bercaw, L., Ciancetta, M., Berglund, J., Ross, S., & Stephens, G. (2012) *The Effects on Student Mathematics Achievement of Academy versus Institute Models of Teacher Professional Development*. Poster presentation of peer-reviewed research report presented at the 2012 Annual Meeting of the American Educational Research Association, Vancouver, BC, Canada.

Breeann Flesch: L*ist-distinguishing colorings of graphs.* Forty-third annual Southeastern International Conference on Combinatorics, Graph Theory, and Computing –Boca Raton, FL, March 2012

Breeann Flesch: *A characterization of probe interval 2-trees.* The Mathematical Association of America Pacific Northwest Section Meeting – Portland, OR, April 2012

Matthew Nabity: *Multicore and the Challenges of the Nonsymmetric Eigenvalue Problem.* Ninth International Workshop on Accurate Solution of Eigenvalue Problems – Napa Valley, June 2012.

Mike Ward: Cayley-Sudoku Tables, Loops, Quasigroups, andMore Questions from Undergraduate Research, XXXI Ohio State-Denison Mathematics Conference May 2012

Grant Writing Activities

"Sonia Kovalevsky Mathematics Day for High School Girls," Burton & C. Beaver, WOU Foundation, 2012

c. Service

Cheryl Beaver

- Advises 12 students in the mathematics major, mathematics education major, mathematics minor, or mathematics/computer science major
- Advised students at SOAR and T-SOAR
- Served as Mathematics Chair Winter and Spring 2012
- Served on Faculty Senate
- Committee Member for Association for Women in Mathematics Sonia Kovalevsky Day Committee
- Committee Member for Mathematical Association of America Minicourse Committee
- Member of the Oregon Mathematics Specialist Task Force – a group attempting to pass rules for an Elementary Mathematics Specialization for the state of Oregon

Scott Beaver

- Advises 33 Mathematics students; 25 majors and 8 minors.
- 2010-2012 WOUFT Chief Bargaining Officer
- SB 242 Oregon Retirement Plan Committee Member
- Faculty Adviser to Dr. Lin Lin, Visiting Scholar from Shenyang, China
- Western Oregon University PURE Executive Committee Member

Hamid Behmard

- Advises 16 advisees
- Member of the Faculty Development Committee
- Faculty member of the University Accreditation Committee (UAC)
- Served as the treasurer for The National Honor Society of Phi Kappa Phi (WOU Chapter)
- President elect of The National Honor Society of Phi Kappa Phi

Laurie Burton

- Advise approximately 4 K – 8 math focus education majors per term.
- Advise 1 or 2 inservice middle school teachers per year
- Advise transfer students on elementary mathematics education transfer courses
- Advise approximately 10 – 12 mathematics and mathematics education (secondary) majors now that advising for K – 8 has shifted to the COE.
- Curriculum Committee, 2010 - 2012
- NSM Curriculum Committee, 2010 – 2012

- NSM PRC, 2011 – 2012
- Mathematics Department Chair, fall term 2011
- Mathematics Department Budget Officer, 2011 – 2012, includes monitoring all aspects of:
    - Graders (hiring and budget)
    - Department budget and spending
    - Drop In Tutoring Lab (in collaboration with Learning Center, tracking all tutors, all materials used in lab, weekly reports from NTT who spend some time in the lab)
    - SEP Designated Instructor for Math 072/097 Learning Seminars (includes working with SEP, setting up guidelines, hiring peer leaders to run 072/097, working with NTT faculty associated with SEP sections)

Matthew Ciancetta

- Math Club Co-Advisor
- Participated in SOAR advising
- Math Education Committee Member

Breeann Flesch

- Sonia Kovalevsky Day Co-Organizer
- Math Education Committee Member
- Maurice Undergraduate Initiative Review Committee Member

Matthew Nabity

- Informal advising of approximately 10 students from my Calculus class and other lower division courses.

- Mathematics Department
- Faculty sponsor for one student's capstone Senior Project during the winter and spring terms.
- Math Club Faculty Co-advisor.
- Math 243 Coordinator – authorized faculty for course substitutions, challenge tests, and other matters related to MTH 243.

Mike Ward

- 22 advisees in mathematics, mathematics secondary education, and computer science/mathematics.
- Preview Day, TSOAR (one each)
- Pi Mu Epsilon (national math honor society) WOU chapter advisor
- Refereed a paper for the American Mathematical Monthly (the principal publication of the Mathematical Association of America).

Departmental

- Cheryl Beaver, Laurie Burton, and Breeann Flesch with the support of Scott Beaver, Matthew Ciancetta, Hamid Behmard, and Mike Ward, organized the Seventh Annual Sonia Kovalevsky Day in February of 2012. 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.

III. STUDENT ACHIEVEMENTS

- **Undergraduates in Mathematics Scholarship Winners 2011 - 2012**

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APPENDIX 2. LAS Embedded Assessment Action Reports

Archival Summary Report: Departmental Learning Outcomes Assessment
(To be completed and forwarded, electronically, to division office.)

Department: Mathematics Division: Natural Sciences and Mathematics

Department contact: Cheryl Beaver Date: 7/21/2012

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1. Program, major/minor or curriculum components reviewed—indicate which learning outcome(s) these components service:

The Mathematics Department has identified several populations that we serve. It is appropriate to assess the curriculum related to each population. The identified populations are:

(1) students who major or minor in mathematics or major in mathematics/computer science (related curriculum referred to later as "major/minor curriculum")
(2) education majors pursuing a middle/high level authorization with a mathematics emphasis (related curriculum referred to later as "secondary education curriculum")
(3) students taking service courses necessary to satisfy graduation requirements or prerequisites to other courses not in the mathematics department (related curriculum referred to later as "service curriculum")
(4) K-8 education majors taking the core set of classes required for all K-8 majors (early childhood, early childhood /elementary, or elementary/middle with a non-mathematics focus) (related curriculum referred to later as "education service curriculum")
(5) K-8 education majors pursuing the elementary/middle authorization with a mathematics focus area (related courses referred to later as "education math focus curriculum")
(6) In-service teachers pursing a MS in Ed with a focus in mathematics (related courses referred to later as "graduate education curriculum")

Because the mathematics major and mathematics education courses serve such different populations we have identified a different set of learning outcome for each. The outcomes listed in the course catalog apply to populations (1)-(3) and the extended learning outcomes for pre-service and in-service K-8 teachers that can be found on the mathematics department webpage apply to populations (4)-(8). A summary of the curriculum components reviewed this year and the learning outcomes assessed is given in the table below

Curriculum component	Learning outcomes serviced
major/minor curriculum and secondary education curriculum (assessed all together under "major" because of the overlap of the majority of coursework)	mathematics learning outcomes: (1) Develop problem solving, modeling and technological skills. (2) Demonstrate ability to make rigorous mathematical arguments, work with axiomatic systems, and precisely articulate (both in writing and orally) complicated and technical arguments (both mathematical and logical).
service curriculum	mathematics learning outcome: (1) Develop problem solving, modeling and technological skills.
education service curriculum and education math focus curriculum	extended learning outcomes for pre-service and in-service K-8 teachers 1. Problem Solving and Problem Writing Skills -

	the ability to create and understand complicated situations, which are applications of K-8 mathematical topics and to apply learned skills and techniques to resolve them. 2. Ability to Model Problems - the ability to translate various real-world scenarios into mathematical models that can be explored by hands-on models, paper-and-pencil methods and technological applications where appropriate. 3. Communication Skills - Ability to precisely articulate (both in writing and orally) K - 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.

2. Assessment methods (type of data reviewed):

Curriculum component	Assessment methods
major/minor curriculum and secondary education curriculum	final exam scores in select upper division courses ETS Major Field Test in Mathematics scores senior project / math education capstone papers senior project/ math education capstone presentations
service curriculum	selected questions from final exams and possibly homework questions; final course grades
education service curriculum and education math focus curriculum	exam and final exam scores in select courses items from course activities in select courses lesson plan activities in select courses mentoring activity in MTH 396

3. Actions to be taken by the department:

Curriculum	Action
All	The department will keep track of assessment data and file it electronically each term.
major/minor curriculum, secondary education curriculum	We did not assess our learning outcome 3. The department will review this learning outcome next year and revise it to better reflect the practices in the courses so we can develop appropriate assessment for the outcome.
service curriculum	During the 2011-2012 the course catalog descriptions for 070,095,111 were updated to reflect our learning outcomes. We will continue to emphasize the items identified in the assessment plan in class work and homework.
K-8 curriculum	We will review the learning outcomes and decide if they still most appropriately reflect our goals for these courses. We will decide if we need to separate the education service and focus assessments which are currently combined.
In-service curriculum	This was not assessed this year so we plan to develop an assessment for it during 2012-2013.

4. Expected enhancement to departmental programming or support to other academic units:

As we review our learning outcomes for various curriculums it will keep our goals in focus. We will continue to emphasize our learning outcomes through class work, homework, exams and course activities.

5. Plan for follow-up actions or tracking

All: We will carefully archive assessment items and scores in an organized electronic folder. We will review the data on a yearly basis to see if our target goals are being met.

K-8 Curriculum: We plan to review activities during the year to better identify sources for assessing learning outcome 2. We will review our learning outcomes to make sure they accurately reflect the program goals.

Service Curriculum:
For B.S.: Our plan is to review Cotton's 111 final exam data for the Winter 2012 (42 students) and 2012-2013 academic year as data is gathered.

For B.A. During the 2012-2013 year, the course catalog description for 105 will be analyzed to assure it reflects these learning outcomes.

For all four courses, Math 070, 095, 105 and 111, during the summer of 2011, continuing throughout the 2011-2012 academic year, and planned for future academic years, the Mathematics Department, in collaboration with The Learning Center, has instituted free drop in mathematics tutoring in a dedicated room in the library to address just in time help for students (currently there are 20 – 25 hours of tutoring available per week) and to offer a learning environment to help at-risk students succeed as they navigate either the 070-095-111 or 105 path, with an end goal to increase retention. The schedule for drop in tutoring is posted on a web page (www.wou.edu/math/tutor) and regularly announced in all mathematics service courses.

The Learning Center is in a continuous process of analyzing the times that best serve the WOU student population, and each term, adjust the hours accordingly.

The Mathematics Department is starting to gather data on how the drop in tutoring availability and use is increasing student success.

The majority of the NTT instructors teaching these four service mathematics courses spend one to two hours a week at the drop in tutoring center and write short weekly reports about the experience. This allows the Mathematics Department to continuously assess the effectiveness of the tutors, the tutoring and address any issues or needs for the drop in tutoring program that arise.

The NTT reports as well as data on the number of students using the drop in tutoring program are housed in the mathematics shared drive.

Departmental Assessment Plan: Student Learning Outcomes
(Please submit, electronically, to division office.)

Program Information	
Academic Program (Major)	Mathematics, Computer Science/Mathematics
Degree	BS, BA
Department	Mathematics
Division	Natural Sciences and Mathematics
Academic Year	2012-2013
Departmental Contact Person	
Name	Cheryl Beaver
Title	Department Chair
Department	Mathematics
E-Mail Address	beaverc@wou.edu
Extension	88404
Program Mission Statement and Learning Outcomes	
1. Develop problem solving, modeling and technological skills. 2. Demonstrate ability to make rigorous mathematical arguments, work with axiomatic systems, and precisely articulate (both in writing and orally) complicated and technical arguments (both mathematical and logical). **3.** Understand the distinction between applied and theoretical mathematics, the connection between the two fields, and the breadth of each field	
Program Learning Outcome Assessment	
Learning Outcomes published in the most recent academic catalog.	Outcome 1: Develop problem solving, modeling and technological skills. Outcome 2:

	Outcome 3
Target	80% of students earn grades of C- or better on course-embedded assessments. Each graduating cohort is in the 75th percentile in the ETS Major Field Test in Mathematics.
Data Source	WOU coursework. ETS
Means of Assessment	Course-embedded assessments in the form of final exams from the following courses: MTH 341 Linear Algebra, MTH 365 Probability, MTH 366 Statistics, MTH 358 Mathematical Modeling. Final exams from all students will be used. ETS Major Field Test in Mathematics. All graduates take the test.

Means of Scoring	Answer keys for the course-embedded assessment. Assessment done by course instructor. Mathematics is fortunate to be in a situation where essentially every question on every exam in these courses addresses one or more of the aspects of this outcome. Therefore, total scores will be reported. Comparative data provided each year by ETS.

Evidence Storage	Exams (scanned in pdf format) and accompanying scoring data maintained in a folder on the M-drive. ETS data also maintained on the M-drive.

<table>
<tr><th colspan="2">Program Learning Outcome Assessment</th></tr>
<tr><td>Learning Outcomes published in the most recent academic catalog.</td><td>
<table>
<tr><td>Outcome 1</td><td></td></tr>
<tr><td>Outcome 2</td><td>Demonstrate ability to make rigorous mathematical arguments, work with axiomatic systems, and precisely articulate (both in writing and orally) complicated and technical arguments (both mathematical and logical).</td></tr>
<tr><td>Outcome 3</td><td></td></tr>
</table>
</td></tr>
<tr><td>Target</td><td>80% of students earn grades of C- or better on course-embedded assessments.</td></tr>
<tr><td>Data Source</td><td>WOU coursework.</td></tr>
<tr><td>Means of Assessment</td><td>Course-embedded assessments in the form of final exams from the following core courses: MTH 344 Group Theory, MTH 345 Ring Theory, MTH 311 & 312 Advanced Calculus I & II. Final exams from all students will be used.

Senior Papers (from MTH 403 & 404, the mathematics capstone)

Videos of Senior Presentations (also from MTH 403 & 404).</td></tr>
</table>

Means of Scoring	Answer keys for the course-embedded assessment. Assessment done by course instructor. Mathematics is fortunate to be in a situation where the majority of questions on every exam of these core courses address this outcome. Therefore, total scores will be reported. Senior project talks scored with a rubric (attached) by the instructor. Total scores reported. Senior papers scored with a rubric (attached) by the instructor. Total scores reported.

Evidence Storage	Exams and senior papers (scanned in pdf format) and accompanying scoring data maintained in a folder on the M-drive. Videos and accompanying scoring data maintained in a folder on the M-drive.

WOU Mathematics Department - Rubric For Senior Project Paper – Winter 2012

	Criteria (from syllabus)	Not met 1	Largely met 2	Fully met 3	Exceed 4	Wt.	Total
Mathematics	Appropriate depth & sophistication; significant mathematical content; shows the sophistication expected of an upper division math student					2	
	Correctness: definitions, theorems, proofs correct				N/A	2	
	Clarity: definitions, theorems, proofs clear					2	
Originality	Original collection of related materials, includes original examples or special cases (when possible), not overly bound to the style of the source.					2	
Drafts	Incorporated draft feedback				N/A	2	
Mechanics							
Formatting	AMM style; typed; 1.5 spacing				N/A	1	
Bibliography	Sources in AMM style; citations in one of the two styles on the Guidelines.				N/A	1	
Grammar & Writing	Good sentence structure; easily understood and mature writing style; generally correct spelling, grammar and punctuation ; smooth transitions					2	
Organization	Clear and focused message; logical progression of ideas				N/A	2	
Audience	Accessible to an average senior mathematics major at WOU				N/A	2	
TOTAL	(fully meeting all categories ~87% or B+)						/62

Departmental Assessment Plan: Student Learning Outcomes

(Please submit, electronically, to division office.)

Program Information	
Academic Program (Major)	Mathematics education service curriculum and Mathematics education math focus curriculum
Degree	part of the BA/BS degree in Education
Department	Mathematics
Division	Natural Sciences and Mathematics
Academic Year	2011-2012
Departmental Contact Person	
Name	Cheryl Beaver
Title	Department Chair / Associate Professor
Department	Mathematics
E-Mail Address	beavec@wou.edu
Extension	88404
Program Mission Statement and Learning Outcomes	
The Mathematics Department at Western Oregon University is committed to the teaching of mathematics and the communication of mathematical ideas. Faculty members believe that both the assimilation of mathematical knowledge and the enhancement of one's capacity for mathematical reasoning are essential outcomes of a liberal arts education.	
Program Learning Outcome Assessment	
Learning Outcomes published in the most recent academic catalog.(*The learning outcomes for the education portion of the mathematics curriculum is found on the math department webpage under "extended learning outcomes for pre-service and in-service K-8 teachers"* *http://www.wou.edu/*)	Outcome 1: 1. Problem Solving and Problem Writing Skills - the ability to create and understand complicated situations, which are applications of K-8 mathematical topics and to apply learned skills and techniques to resolve them. Outcome 2: Outcome 3:

las/natsci_math/math/missiongoals.php)	
Target	*Describe what level of proficiency or percent student attainment of the stated learning outcome.* 80% of students earn scores that meet expectations or above (C- or above equivalent on each assessment activity)
Data Source	*Describe where and when data will be collected, how and if students will be sampled, and estimated sample size.* WOU course work (exam scores) – the data will be collected during the term
Means of Assessment	*Describe in detail the method of assessment you will be using (e.g., capstone project, course-embedded assessment, standardized instrument, etc.).* Course-embedded assessment: MTH 396 is a problem solving course. There is a mid-term and final exam devoted to testing problem solving. All students in the education program are required to take this course after the MTH 211-212-213 sequence. Their ability to solve problems is also a reflection on how well they learned the basic material in MTH 211-212-213. The assessment for this learning outcome will be scores on these two problem solving exams in MTH 396.
Means of Scoring	*Describe how you will score the assessment. For example, will you use a rubric or answer key, or will it be scored by a testing company? (If you plan to use a rubric, be sure to include the rubric as an appendix.) Who will do the scoring? One or more people? How will scores be reported (e.g., total scales or subscores)?* The exams will be scored by the instructor of the course. The scores will be recorded in aggregate for each section of the course as percentages in one of three categories: exceeds expectations (A-B range); meets expectations (B- to C- range); or below expectations (D-F range)

Evidence Storage	*Describe how/where the evidence pertaining to the assessment process is being archived. Electronic archive is preferred when possible. Please be certain that records can be retrieved for review by internal (e.g., division, college, university) or external (e.g., NWCCU) reviewers.* Exams and scores for each section will be scanned and saved electronically on the mathematics department drive.

<table>
<tr><th colspan="2">Program Learning Outcome Assessment</th></tr>
<tr><td>Learning Outcomes published in the most recent academic catalog.</td><td>
<table>
<tr><td>Outcome 1</td><td></td></tr>
<tr><td>Outcome 2</td><td>Ability to Model Problems - the ability to translate various real-world scenarios into mathematical models that can be explored by hands-on models, paper-and-pencil methods and technological applications where appropriate.</td></tr>
<tr><td>Outcome 3</td><td></td></tr>
</table>
</td></tr>
<tr><td>Target</td><td>Describe what level of proficiency or percent student attainment of the stated learning outcome.
80% of students earn scores that meet expectations or above (C- or above equivalent on each assessment activity)</td></tr>
<tr><td>Data Source</td><td>Describe where and when data will be collected, how and if students will be sampled, and estimated sample size.
WOU course work and exam scores – the data will be collected during the term</td></tr>
<tr><td>Means of Assessment</td><td>Describe in detail the method of assessment you will be using (e.g., capstone project, course-embedded assessment, standardized instrument, etc.).
Course-embedded instruction – various problems on final exams or in class projects (such as the geometer's sketch pad). Our plan is to review material in select courses and choose items for assessment during the next year.</td></tr>
<tr><td>Means of Scoring</td><td>Describe how you will score the assessment. For example, will you use a rubric or answer key, or will it be scored by a testing company? (If you plan to use a rubric, be sure to include the rubric as an appendix.) Who will do the scoring? One or more people? How will scores be reported (e.g., total scales or subscores)?

The scoring will be done by the instructor. The scores for each activity will be recorded in aggregate for each section of the course as percentages in one of three categories: exceeds expectations (A-B range); meets expectations (B- to C- range); or below expectations (D-F range)</td></tr>
</table>

Evidence Storage	*Describe how/where the evidence pertaining to the assessment process is being archived. Electronic archive is preferred when possible. Please be certain that records can be retrieved for review by internal (e.g., division, college, university) or external (e.g., NWCCU) reviewers.* Copies of assessments items and scores will be saved electronically on the mathematics department drive.

Program Learning Outcome Assessment	
Learning Outcomes published in the most recent academic catalog.	Outcome 1
	Outcome 2
	Outcome 3: Communication Skills - Ability to precisely articulate (both in writing and orally) K - 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.
Target	*Describe what level of proficiency or percent student attainment of the stated learning outcome.* 80% of students earn scores that meet expectations or above (C- or above equivalent on each assessment activity)
Data Source	*Describe where and when data will be collected, how and if students will be sampled, and estimated sample size.* WOU course work – the data will be collected during the term
Means of Assessment	*Describe in detail the method of assessment you will be using (e.g., capstone project, course-embedded assessment, standardized instrument, etc.).* Scores on lesson plan development activities in the upper division mathematics education courses (MTH 393,394,398,492,494,495). These activities require students to develop mathematics topics for elementary and middle level students. Scores on MTH 396 mentoring activity (pass/fail). This activity requires students to communicate using written letters with actual elementary grade students.

Means of Scoring	*Describe how you will score the assessment. For example, will you use a rubric or answer key, or will it be scored by a testing company? (If you plan to use a rubric, be sure to include the rubric as an appendix.) Who will do the scoring? One or more people? How will scores be reported (e.g., total scales or subscores)?* The scoring will be done by the instructor. The scores for each the lesson plan activity will be recorded in aggregate for each section of the course as percentages in one of three categories: exceeds expectations (A-B range); meets expectations (B- to C- range); or below expectations (D-F range). The scores for the mentoring activity will be recorded as percentages earning a pass or fail.

Evidence Storage	*Describe how/where the evidence pertaining to the assessment process is being archived. Electronic archive is preferred when possible. Please be certain that records can be retrieved for review by internal (e.g., division, college, university) or external (e.g., NWCCU) reviewers.* The instructions for the lesson plan activity and the scores for the lesson plan and mentoring activity will be stored electronically in the mathematics drive.

Departmental Assessment Plan: Student Learning Outcomes

(Please submit, electronically, to division office.)

Program Information	
Academic Program (Major)	Mathematics service courses: 070, 095, 105 and 111
Degree	N/A
Department	Mathematics
Division	Natural Sciences and Mathematics
Academic Year	2011-2012
Departmental Contact Person	
Name	Laurie Burton / Avery Cotton
Title	Professor / 070, 095, 111 Course Coordinator
Department	Mathematics / Mathematics
E-Mail Address	burtonl@wou.edu / cottona@wou.edu
Extension	8-8345 / 8-9708
Program Mission Statement and Learning Outcomes	
Teaching of mathematics and the communication of mathematical ideas. Faculty members believe that both the assimilation of mathematical knowledge and the enhancement of one's capacity for mathematical reasoning are essential outcomes of a liberal arts education.	
Program Learning Outcome Assessment	
Learning Outcomes published in the most recent academic catalog.	Outcome 1: Develop problem solving, modeling and technological skills. Outcome 2: Demonstrate ability to make rigorous mathematical arguments, work with axiomatic systems, and precisely articulate (both in writing and orally) complicated and technical arguments (both mathematical and logical). **N / A for service courses** Outcome 3: Understand the distinction between applied and theoretical mathematics, the connection between the two fields, and the breadth of each field. **N / A for service courses**

Target	**Outcome 1** For the B.S.: At the end of Math 111, students passing the course with a C- or better (70% or better), given a context and a set of data, should be able to apply problem solving skills to choose an appropriate model, develop a regression equation and make predictions using the model. At the end of Math 111, students passing the course with a C- or better (70% or better), will be able to use their graphing utility to graphically obtain local extrema for a quadratic function. For the B.A.: At the end of Math 105, students passing the course with a C- or better (70% or better), given a context and a set of data, should be able to apply problem solving skills to answer basic standard normal distribution questions.
Data Source	**Outcome 1** For the B.S.: These problem solving and technological skills are assessed in every section via homework and / or exam questions. Our plan is to review Cotton's 111 final exam data for the Winter 2012 (42 students) and 2012- 2013 academic year as data is gathered. For the B.A.: These problem solving and technological skills are assessed via in class work, homework and exam questions. Our plan is to review Cotton's 105 data for fall 2012 (approximately 30 students).
Means of Assessment	**Outcome 1** For the B.S.: Review of selected final exam and possibly homework questions. For the B.A.: Review of selected final exam and possibly homework questions.
Means of Scoring	**Outcome 1** For the B.S.: Final exam questions are directly graded by 111 instructors. For the B.A.: Final exam questions are directly graded by 105 instructors.

Evidence Storage	**Outcome 1** For the B.S.: Scoring data stored in shared department drive and included in report to department and division chairs. For the B.A.: Scoring data stored in shared department drive and included in report to department and division chairs.