DIVISION OF NATURAL SCIENCES AND MATHEMATICS
2009-2010 ANNUAL REPORT (August 16, 2010)

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I. EXECUTIVE SUMMARY

A. Division Highlights

The 2009-2010 academic year was associated with continued growth and infrastructure development in the Division of Natural Sciences and Mathematics (NSM). Forward progress in the OHSU-Monmouth nursing program at the WOU campus stimulated continued trajectories in enrollment trends for 100- and 200-level biology and chemistry courses. Another round of campus-wide opportunity funds and stimulus monies resulted in continued equipment purchases and building renovation projects, as experienced in the previous year. Significant events of note in the Division include: (1) continued pre-nursing/professional enrollment trends (Chemistry 100-200 levels, Biology), (2) continued increasing demand for lower-level mathematics courses (MTH70, MTH95, MTH100-levels), (3) hiring and departure of a tenure-line replacement faculty in Mathematics, (4) continued integration of the Biology-Earth Science lab preparator into the duty rotation, (5) completion of the NS017 (ES100 lab), NS022 (Earth Science lab preparation area) and NS101 (Earth Science and Chemistry lectures) room remodels, (6) conversion of the NS021 storage room into a three-room office suite, (7) installation of smart-room technology and computer stations in NS115 chemistry lab (CH100, Organic), (8) initiation of the NS004 remodeling project (Biology collections and upper division labs; in progress), and (9) ancillary equipment upgrades including new microscopes (Earth Science and Biology), new student computer workstations (Earth Science, Chemistry, Biology), and an incubator system (Biochemistry and Molecular Biology). At the same time, dedicated faculty and staff advanced other program areas and continued offering high-quality educational opportunities for the greater student population. The following is a summary of program highlights within the NSM division (*Note: for purposes of political balance, program summaries are presented in reverse alphabetical order in even years, and ascending order in odd*).

The strengths of the NSM Division include:

- Academic programs that focus on quality teaching, close student-faculty interaction via individualized mentoring, small upper-division class sizes, inquiry-based laboratory and field experiences, and promotion of undergraduate research.
- The highly subscribed LACC 100-level lab science courses for non-majors significantly contribute to the Liberal Arts mission at WOU and provide students with opportunities for relevant, real-world problem solving. These courses also provide the foundation for pre-nursing and pre-education students.
- NSM faculty continuously strive to improve their respective curricula, embrace a technology-enriched learning environment, and implement meaningful assessment methodologies.
- NSM faculty actively serve as leaders on campus committees and regularly participate in a variety of professional service positions, both at the state and national levels.
- NSM faculty members are actively engaged in a spectrum of peer-reviewed research, publications, and related professional development.
- NSM division students are actively engaged in independent research projects, internships, and scholarship at the local, state, and national levels
- The Physics program is actively engaged in K-12 community outreach and improving science teacher training in the State of Oregon. Linkages with NASA-based grants programs provides

WOU student scholarships and supports teacher training opportunities with a focus on global climate change in the Earth system.

- The Mathematics Department is nationally recognized for its math education program and is making significant contributions in the area of teacher preparation. This recognition combined with strong enrollment numbers at all levels attest to the success and assessment-driven curriculum work by the faculty.
- The Earth Science program is one of the campus leaders with respect to service contributions to the Liberal Arts Core Curriculum and pre-education programs. The ES100 sequence serves approximately 1400 students per year, is a common first destination for entering freshman, and has a notably high retention rate between fall, winter, and spring terms.
- The Chemistry program provides rigorous training for professional scientists, affords students the opportunity to gain direct hands-on experience using specialized techniques, has developed a strong collaboration with the Oregon State Police forensics program, and is experiencing continued enrollment demand in health science-related service courses.
- The Biology program is notably robust with a strong number of majors and graduates, a well-developed scholarship fund, a consistent record of post-baccalaureate student placement, and continued enrollment demand at all levels, including pre-nursing and pre-professional.

B. Mathematics Department

- College Algebra, MTH 111, was once again taught primarily by the tenure-track members of the department, as delineated in the Mathematics Department self-assessment from 2007. We introduced a new textbook in this course as well, which again focused on modeling. With this new textbook, students are able to have online homework which allowed more immediate feedback and improved instructional methodology. A similar approach with online homework was implemented in MTH 70, MTH 95, MTH 112, and the calculus sequence. We have begun to assess the effectiveness of the online homework system, both with respect to student learning outcomes and quality of experience.
- The Mathematics Department experienced notably robust upper division enrollments this year, with the highest numbers in the senior project course since its creation. There were seventeen mathematics-related oral presentations at the 2010 Academic Excellence Showcase, delivered by mathematics majors and pre-service teachers with a mathematics focus. There were also twelve posters by eighteen students in the same event. We also had students present at the 2009 MathFest (the annual national summer meeting of the Mathematical Association of America (MAA)) in Portland, the annual meeting of the Pacific Northwest Section of the MAA in Seattle, and the Northwest Undergraduate Mathematics Symposium in Corvallis. We will also have externally-funded students present at the 2010 MathFest in Pittsburgh, PA this August.
- The Mathematics Department worked closely with SEP to help their students with remedial MTH 70 and MTH 95. We have introduced Supplemental Instruction Tutors, where a mathematics major 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.
- Department faculty serve in a number of leadership positions on campus. Laurie Burton served as the chair of the Curriculum Committee this year; Scott Beaver will begin his term as chair of the Collective Bargaining Team in the fall. He served as the Faculty Union the past couple of years and as the vice president of Faculty Senate this year. Klay Kruczek will serve as the secretary of the Academic Requirements Committee beginning in the fall. We also run a couple each of oral presentation sessions and poster sessions at WOU's annual Academic Excellence Showcase.

- The Mathematics Department was excited this year to have a new tenure-track faculty member, Mary Beisiegel, of the University of Alberta. She was to fill the position vacated by Maria Fung, who left to teach at Worcester State College. Unfortunately, Dr. Beisiegel decided to pursue other interests after completing one year of work at WOU. We hope to hire someone for the 2011 – 2012 academic year. In the meantime, we will use non-tenure-track faculty to cover Mary's classes.

C. Earth and Physical Sciences Department

- Earth and Physical Science faculty members actively served as leaders on a number of campus-wide initiatives including NSM Division Chair in the College of LAS (Taylor), the Academic Excellence Showcase planning committee (Templeton), advisor to the WOU Honors Program (Myers) and NSM division representatives to the Collective Bargaining team (Schoenfeld and Wade).

- Earth and Physical Science faculty members actively served as professional leaders in their fields. Professional service activities include: leadership in state-level geoscience advisory boards (Taylor), participation in NASA Oregon Space Grant Program (Schoenfeld), and collective faculty membership and participation in professional societies (American Association of Physics Teachers, American Geophysical Union, Association of American Geographers, Council on Undergraduate Research, Friends of the Pleistocene, Geological Society of America, International Organization of Palaeobotanists, National Association of Geoscience Teachers, National Science Teachers Association, Oregon Academy of Science).

- Earth and Physical Science faculty members continue to be actively engaged in a wide spectrum of peer-reviewed research, publication, and related professional development. Dr. Myers conducted an analysis of Late Miocene Anaverde Flora in southern California and continued collaboration with several colleagues on Eocene-Miocene paleobotany of the John Day Basin, Central Oregon. Dr. Templeton conducted sabbatical research on tephra geochemistry at Newberry Volcano, Oregon and was PI on an NSF grant proposal to upgrade the ES100 laboratory curriculum at WOU (with Taylor and Wade as Co-PIs). Dr. Taylor continued watershed research in western Oregon and embarked on a new NIJ-funded finger print analysis project with Biology colleagues (Dutton, Dutton, Aldrich). Dr. Schoenfeld, Physics, conducted NASA-funded sabbatical research on children's book content and reading perceptions related to Earth system science. Current (2009-2010) active research grants and pending proposals related to EPS Department faculty total approximately $1M.

- Earth and Physical Science faculty members continue to actively engage high-quality undergraduate teaching, learning, and curriculum development. With 4 tenured faculty and 6 adjunct instructors, the EPS department generated approximately 8500 student credit hours (SCH) during the 2009-2010 academic year, accounting for over 25% of the total production in the Division of Natural Sciences and Mathematics.

- The Earth and Physical Science programs continue to grow in a sustainable manner, in parallel with overall university trends. ES100 LACC enrollments and retention are very strong. In 2009-2010, the program actively advanced with respect to opportunity funding and infrastructure development in NS017 and NS101.

D. Chemistry Department

- The demand for the Ch 104-105-106 sequence driven by increasing numbers of students entering the pre-nursing program continued. To aid accessibility of this course, the department instituted a trailer course offering one section beginning with Ch 104 in the winter term (Ch 105 spring; Ch 106 summer) so that students would not have to delay by a full year completing the sequence if they were unable to enroll in the regular fall offering of Ch 104 due to lack of seats or lack of course prerequisites. The growth in this area necessitated the addition of one additional adjunct at

approximately 1 FTE for the entire academic year. In addition, enrollments remained strong for the summer session offering of the entire sequence. The growth in this area s expected to continue for the 2010-2011 academic year, as evidenced by the addition of one 24 student laboratory section above the levels for fall 2009.

- Enrollments in other areas remain strong, including the upper division courses. Although most programs in the Biology Department no longer require organic chemistry, enrollments have held relatively constant due to increases in second year chemistry majors and students pursuing chemistry minors. The chemistry department graduated four students during the 2009-2010 academic year, with three students earning the traditional chemistry degree and one completing the requirements of the forensic chemistry option.

- WOU chemistry graduates remain competitive in gaining entrance to graduate programs. We currently have four graduates in PhD programs, and 2009-2010 graduate Jennifer Blaser has been accepted into the graduate chemistry program at Colorado State University for fall 2010.

- The addition of laboratory computers and smart room capability into NS 115 during the year has given us the ability to better integrate technology into the nursing chemistry, organic chemistry and applications in forensic chemistry laboratory classes. We look forward to making many changes in the curriculum of those laboratory experiences utilizing this equipment.

E. Biology Department

- The enrollment numbers in Biology continue to show robust growth (~ 2600 students taking biology-related coursework during the 2009 – 2010 academic year). The observed increase from previous year extends to coursework at both the majors and non-majors levels.

- Biology students (current and former) have been successful in their pursuit of biology-related careers. For example, several were accepted into professional schools and advanced degree programs. At least one graduate was admitted into a medically-related, graduate level professional school (i.e. medical school, dental school, physician's assistant and pharmacy programs), and at least one student was accepted to a graduate program in biology. In addition, 24 students were accepted into professional undergraduate programs (e.g., nursing school, dental hygiene school) both within and outside the state of Oregon.

- The Biology Department continues to pursue opportunities to enhance laboratory space and technologies. Monies made available through the university allowed for the summer 2010 remodel of the biology laboratory located in NS 004, including the addition of smart room technologies. In addition, monies were secured to purchase new microscopes (e.g., microbiology = 12 compound microscopes) and new computers for student use (e.g., NS 004 = 12 computers).

- Collectively, Biology faculty published six papers in peer-reviewed journals, with one other paper currently in the review process. We also were involved in presenting / preparing fourteen refereed papers at state and national meetings and workshops. Two of these papers and presentations were co-authored by current and / or former WOU students who contributed significantly to them.

- Biology faculty members continue to receive grant monies for their research. This past year, monies have been received from the Department of Justice (1 grant; ~ $685,000; co-authored with WOU Earth Sciences faculty and the Oregon State Police), Oregon SeaGrant (~ $73,500), and the WOU Faculty Development Committee (3 grants; ~ $8300).

- Biology faculty members contributed significantly to the governance of WOU. Biology faculty were represented on five university-wide committees, faculty senate, Institutional Review Board, and the Academic Excellence Showcase planning committee.

- Biology faculty members continued to provide individualized advising geared towards each student's interests and career goals. Our department members also continue to serve as the primary advisors for the Natural Science Club.
- Several of our faculty served as mentors for undergraduate research projects over the last year, including serving as committee members for students in the Honors program. In addition, four student research projects mentored by biology faculty were presented during the WOU Academic Excellence Showcase.
- Biology faculty members continued to be actively involved in professional societies outside the WOU community with several taking on leadership roles at the local, regional, and national levels.
- The Biology department was able to award more than $25,000 of scholarships to undergraduates pursuing a degree in biology for the 2010 – 2011 academic year.
- Dr. Irja Galvan retired from the Biology Department at the end of the 2009-2010 academic year after more than a decade of service to Western Oregon University. We are currently performing a search for a non-tenure short-term replacement and will be initiating a search for a tenure-track replacement during the 2010-2011 academic year.

II. ENROLLMENT TRENDS

A. Mathematics

- 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 pre-service K – 8 teachers, and MTH 392 – MTH 398 and MTH 492 – 495 are for pre-service K – 8 teachers wishing to teach mathematics.
- The number of students pursuing a mathematics major had remained steady in the mid-30's over the previous years, but it seems we have more mathematics majors coming up. This year, we had the highest number of graduating seniors (10) in a long time. Our introduction to proofs class, which is taken by mathematics majors early in their time here, has increased from an enrollment of 20 students to almost 30 students in the past couple of years.
- 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. For the 2010 – 2011 academic year, we have increased the number of sections of MTH 105 offered each quarter because the two sections of this course filled up so quickly 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. In the past students who placed into MTH 112 had to wait until the winter to begin taking mathematics. This also delayed these students from taking MTH 251. With the reallocation of resources due to the reduction of upper division mathematics electives offered, the department will offer another sequence of MTH 112 (fall), MTH 251 (winter) and MTH 252 (spring). We also do not know what the effect of pre-nursing curricula will be on the enrollment in MTH 243.
- The enrollment in the introductory mathematics courses for pre-service K-8 teachers has been steady, but we plan to offer a different trailer sequence of the foundations sequence (MTH 211 – 213) beginning in the spring 2011 to help students who miss one course in the sequence. We will still offer five sections of these courses each quarter (Fall 2011: 2 sections of MTH 211, 1 section of MTH 212, and 2 sections of MTH 213).

B. Earth and Physical Sciences

- The Earth Sciences program has experienced a steady number of graduates (range: 4-8) since 2001 and a stable enrollment in upper division major-minor courses (range: 6-18, average: 11). Earth Science enrollments have been increasing over the past 4 academic years (2006-2010). Total student credit hour production increased 15%, ES100 enrollments 11%, and ES200 enrollments have stabilized at ~30-35 students in fall term. The upper division population is steady, with a consistent range of 7 to 15 students per course. Cumulative growth rate in these areas is around 10% annually, approximately paralleling overall university trends. Ten-year average annual student credit hour production (SCH) in the program is ~8200, second in magnitude to Biology in the division (average annual ~9100 SCH over the same time period). The program is economical and efficient, with the highest annual credit-hour production per faculty-staff member (~400 SCH per faculty-staff) and the lowest salary:SCH ratio in the NSM Division.

- The Earth Science student population is quite diverse in terms of skills, interests, and career goals, ranging from Earth Science majors with focused career objectives to Environmental Studies minors and Integrated Science Education majors. The average annual number of majors and minors in the Earth Science program ranges from 40 to 50, with 1400 students tracking through the LACC ES 104-105-106 sequence. Most ES 100 students are in their freshman or sophomore years, and over 60% list their major as "pre-education". Enrollment in upper-division specialty courses ranges from 8-15, with 25 to 45 in more accessible lower and upper division courses (e.g., ES 201-202-203 Principles of Geology, ES 331 Oceanography, and ES 390 Meteorology).

- Demographically, our students are predominantly white/Caucasian, 20-24 years of age, with a female-to-male ratio of 1:3. Preliminary analysis of select course data from 1999-2005 (S. Taylor upper-division class rosters; n = 176) indicates that approximately 75% of our upper-division students are declared Earth Science majors and minors. The remaining 25% are working on graduate education degrees, free electives, and ancillary minors such as Environmental Studies.

- A total of 63 WOU Earth Science graduates were informally tracked for the period extending from 1999-2010. The following is a breakdown of post-baccalaureate employment outcomes: No Information Available = 22.2%, Science Education = 11.1%, Geotechnical-Environmental-Water Resources-Mining-Construction = 27.0%, GIS-Geospatial Technology = 6.3%, Other-Retail-Miscellaneous = 33.3%. Based on the above data, approximately 45% of Earth Science graduates are confirmed to have engaged gainful employment as a professional geoscientists or science educator's, 33% are working in other sectors of the economy, and no information is available for 22% of the population. In addition, approximately 5% of WOU Earth Science graduates continue on to graduate school in science or education, in direct alignment with standard student achievement measures and grade distribution curves (i.e. most of the top academic achievers, "A+" students" are motivated to continue on to graduate school).

- Enrollments remain steady in the Physics-200 level service courses with 25 to 30 and 10 to 15 starting out Fall term in the algebra-based (PH201-202-203) and calculus-based (PH211-212-213) sequences, respectively. Fall 2010 enrollment in PH201 is notably high with ~40 students. Improving Physics-sequence retention from Fall to Spring terms is an ongoing concern, and is the focus of curriculum development activities by program faculty.

C. Chemistry

- The Chemistry Department continues to experience growth in the CH100 sequence fueled by the growth in students pursuing the pre-nursing curriculum. To accommodate the students needing this sequence, a trailer section consisting of one lecture and one laboratory section has been added. Growth between Fall 2009 and 2010 required the addition of an additional 24 lecture/lab

seats. The increased enrollment also required the hiring of an additional adjunct whose responsibilities lie almost exclusively in the Ch 100 sequence. Comparison of enrollments for Fall 2007 with pre-enrollment data for Fall 2010 shows the rapid growth over the time period:

	Ch 104	Ch 106	Total Ch 100 sequence Fall term
Fall 2007	132	N/A	132
Fall 2010	257	8	265

- In the 2007-2010 time period, the Chemistry 100 sequence has doubled in student enrollment and increased from two lecture sections to three large lecture sections and one small trailer section. In addition to the traditional school year increases, there has been a strong enrollment in the sequence during the summer term:

Ch 104	14
Ch 105	21
Ch 106	13
Total Ch 100 sequence Summer 2010	48

- Enrollments in the Ch 221-223 sequence remain strong. The one enrollment trend in this sequence is a smaller enrollment in the Ch 221 course during the fall term with larger enrollments in the trailer sections which begins in the winter. This change is due to enforcement of course prerequisites which is requiring more students to complete them during the fall term.

	Ch 221	Ch 223	Total Ch 200 sequence Fall term
Fall 2007	80	14	94
Fall 2010	58	48	106

- Upper division enrollments show increases or steady enrollments. Ch 334-336 remains steady compared to 2007 even though this course is no longer required in any Biology programs other than the various pre-professional (medical fields) programs. Enrollments remain steady in the other required upper division courses without any notable changes.

D. Biology

- There has been continued and significant growth in student enrollment in biology-related courses. Currently, the Biology Department teaching personnel includes eight tenure-track faculty (two full professors, three associate professors, and three assistant professors), and three full-time, non-tenure track faculty. The total hours in the classroom available for the current faculty, assuming 1.0 FTE for each, is 423 hours (36 hours / academic year for tenure-track faculty; 45 hours / academic year for non-tenure track faculty). When including faculty release time for service and research duties, the 2009 – 2010 academic scheduling required ~392 hours over available FTE resources and several non-tenure track faculty members taking on overloads. Approximately 55% of the FTE classroom hours for the year were dedicated to non-majors level coursework and 45% dedicated to majors level coursework.

- While the growth in student enrollment is widespread across the biology curriculum, two areas showed significant increases this past year.

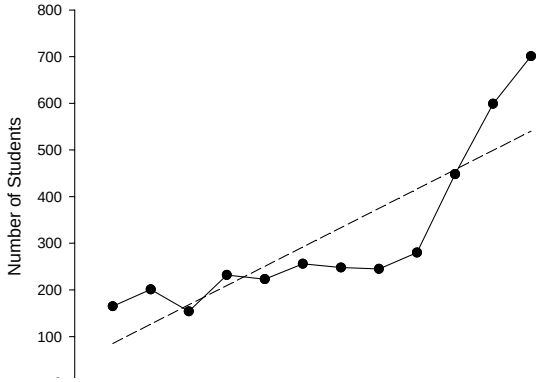

Figure 2. The annual number of students enrolled in the Human Anatomy and Physiology series (BI 234 – 236) since the 1998 – 1999 academic year. The dotted line represents the trend line based on regression analysis of the data.

First, enrollment in our majors level second year sequence (BI 314 – 316; genetics / evolution / cell biology) increased dramatically, from 122 students during the 2008 – 2009 academic year to 154 during the 2009 – 2010 academic year (21% increase; Figure 1). This growth is not surprising due to the increase in our Principles of Biology sequence (BI 211 – 213) that has been observed over the last five years. Assuming that our retention rates remain similar to previous years, we anticipate continued growth across our upper division coursework as students move from the second year sequence and expand out into the various specialized biology emphases.

- Enrollment in our non-major health professional service courses, primarily Human Anatomy and Physiology (BI 234 – 236) and Microbiology for Health Sciences (BI 318), continues to show double digit annual growth (for example, Figure 2). This growth has been largely due to the increase in pre-nursing students over the last several years, although there is also a large group of students interested in the Health and PE programs at WOU and the Human Biology minor, both of which require various health professional service courses. Based on data over the past five years, we expect the growth trend to continue, albeit at a slower rate as we near capacity.

III. SUMMARY OF PROGRAM CURRICULUM CHANGES

A. Mathematics

- New course addition: MTH 805 Math Professional Development Seminar. The course meets the needs of the Professional community for advanced or continuing education in comparatively narrow specialty areas. This will enhance WOU's presence in the Salem professional community and meet WOU's goal to increase community outreach and service beyond Monmouth.

- Course numbering changes: In the past, MTH 403 Senior Project (2) was offered in the winter and spring quarters for a total of 4 credits. To make it clearer for the registrar's office, we have renamed the courses MTH 403 Senior Project I and MTH 404 Senior Project II. We combined the original MTH 404 and MTH 409 to create a new course MTH 409 Practicum; Work Experience; Internship.

- Prerequisite change: Approved for MTH 416: Complex Analysis. We changed it from MTH 312 (a senior level course) to MTH 344 (a junior level course) to give all mathematics majors the opportunity to take this course (since this course is offered every two years).

B. Earth and Physical Sciences

- This past year the Geology faculty implemented several modifications to the Earth Science program curriculum as part of the 2009-2010 catalog. These changes included the following: (1) addition of four new courses and updates to course numbers, titles and/or descriptions for eight existing Earth Science courses; (2) changes to the Earth Science Major, including incorporation of the new courses into the degree plan, addition of three new Mathematics options, revision of the Computer Science requirement, and concomitant credit hour change; and (3) modifications to the Earth Resources, Earth System Science, and Geology Minors to reflect to the course changes. These modifications represent a fine-tuning of Earth Science curriculum, the goal of which is to strengthen and modernize the major to best serve student needs.

- Philip Wade proposed a new "science education methods" course (GS 325) for K-8 Education majors. This course, which will be implemented in the next academic year, is aligned with the broad revisions to the Teacher Education program that were proposed and adopted this past year at the University level.

- A new ES199 Special Topics in Earth System Science, was proposed to be included as an alternative option in the ES100 sequence, but was shelved by the curriculum committee to allow time for division-wide review of LACC course criteria. The LACC criteria review was completed in Spring 2010.

C. Chemistry

- Ch 334, 335, 336 changed from 4 credit hours with embedded laboratory to 3 credit hours no lab.
- Ch 337 Organic Chemistry Lab I added 1 credit hour one lab meeting per week winter term.
- Ch 338 Organic Chemistry Lab II added 2 credit hours two lab meetings per week spring term.
- Added a new course, Ch 345 Introduction to Toxicology 3 credit hours.

- The above changes align with programs at other institutions. Moving the first organic lab to winter term allows students to have some familiarity with organic chemistry to better understand laboratory concepts.

D. Biology

- The Biology program completed a moderately comprehensive adjustment to their curriculum in 2009-2010. Program changes included: (1) increasing the BI200 sequence from 4 to 5 credit hours and the addition of 1 lecture hour per week, (2) a variety of course renumbering and catalog description changes to better align course listings with focus areas, and (3) adjustment of degree requirements to reflect credit-hour changes and course renumbering (refer to departmental report for detailed listing of program changes).

IV. PROGRAM ASSESSMENT ACTIVITIES AND RESULTS

A. Mathematics

- Major Field Test in Mathematics: For the past four springs, the graduating mathematics majors have been given the Mathematics Major Field Test (MFT), put out by ETS. In 2009, the mathematics majors as a whole finished in the 95th percentile in the nation on the MFT. The results from the 2010 MFT are again exciting. This year, the mathematics majors finished in the 90th percentile in the nation. 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 plans to compile the data in the future.

- Senior Project: Scott Beaver 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. This year, we even had a junior Dania Morales create a senior project. 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.

- Embedded Assessment: 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 are included with the departmental report.

- Assessment of the Effectiveness of Online Homework: We have just begun assessing the value of online homework, which is given in MTH 70, 95, 111, 112 and the calculus sequence. This is still in its initial stages, so there is no true data yet, only anecdotal evidence that students find the online homework system effective.

B. Earth and Physical Sciences

- The Earth Science program continues to implement a comprehensive evaluation plan that includes the following strategies: (1) formative embedded assessment, (2) summative assessment of the degree program, and (3) survey-based tracking of current students and graduates. The evaluation strategies described below began during the 2008-09 academic year with formative assessment strategies and will continue through 2012 when we plan to conduct our external review of the Earth Science program.

- Formative Embedded Assessment: Formative assessment of the Earth Science Program is currently being conducted via a series of Embedded Assessment Strategies. Initiated in Spring 2008, these strategies specifically link student performance on course activities to program outcomes. A variety of methods and course activities are used for embedded assessment, including inquiry-based lab exercises, field studies, writing assignments (informal short essays and longer-form research papers), active-learning exercises, oral group presentations, and multi-media work samples. These types of embedded assessment strategies are incrementally being deployed in all Earth Science courses.

- Summative Assessment of Degree Program: The capstone course, Senior Seminar (ES 407), continues to serve as the primary Degree Program Assessment mechanism for Earth Science graduates. The objective of Senior Seminar is for students to conduct in-depth study and research on current topics in the Earth Sciences. By requiring Earth Science students to draw on information from the full range of major courses they have completed during their time as an undergraduate, students must demonstrate proficiency in a broad range of Earth Science content areas. Students are required to complete ES 407 during the final term of their senior year and must satisfactorily complete the capstone course to graduate from the program. Senior Seminar has been successfully incorporated into the campus-wide, Academic Excellence Showcase event sponsored by the Program for Undergraduate Research Experiences and Phi Kappa Phi.

- In conjunction with seminar inquiry-based, work-sample method described above, standardized exit exam models are currently being explored by Earth Science faculty members. Several ideas have been pilot tested. One model utilizes an online exit exam based on national standards established by the Educational Testing Service in the 1990's that comprised part of the Advanced Geology Graduate Record Exam. A second model utilizes the education-based PRAXIS exam for teaching candidates with an emphasis in Earth and physical science content. The third summative assessment tool currently under evaluation is the nationally standardized Fundamental Geology Exam that forms part of the Oregon State Board of Geologist Examiners (OSBGE) professional licensing process. Select student test groups have engaged each of above summative models over the past 8 years, their collective effectiveness and practicality are currently being evaluated. Since this initiative began, a total of 6 WOU Earth Science alumni have taken the OSBGE Fundamental Geology (FG) exam and all have met the passing requirements.

C. Chemistry

The Chemistry Department utilizes both formative and summative methods of assessment to determine how well the program meets our student outcome goals.

<u>Formative Assessment:</u>

- Traditional methods including quizzes and exams taking the form of essays, multiple choice, true/false, and problem solving.
- In class assessment using clicker technology.
- Individual and group oral presentations (e.g. poster presentations, powerpoint presentations).
- Significant writing component including laboratory notebooks, formal laboratory reports, annotated bibliographies, abstracts, and web page development.

- Critical thinking skills are tested via the solving of laboratory unknowns and the development of research questions.

The style and level of formative assessment varies with the type of course content and the instructor.

Formative Assessment highlights:

- The use of clickers in lecture particularly in the Ch 104-106 sequence gave immediate feedback of the level of understanding of topic being discussed. This allowed the instructor to adjust the lecture and increase student learning.
- The Ch 334-336 sequence was assessed through the administration of the American Chemical Society standardized organic chemistry examination and the results compared to national norms. Within the OUS system, performances at the 50th percentile or above are considered to show successful mastery of organic chemistry at the upper division level. The results for the Ch 336 students in Spring 2010 showed that half the students in the class scored at or above this level and 33% of the class scored above the 65th percentile and two students scored above the 90th percentile (93 and 96 percentiles).
- Use of embedded GRE and MCAT questions within the CH 450/451 exam material to gauge the proficiency of these students in the area of biochemistry for entry into professional and graduate school.

Summative Assessment:

Summative assessment is accomplished in via capstone courses and an exit exam. Students take two capstone offerings Ch 461/462 (a two term, inquiry-based laboratory course) and Ch 407 (presentation of a literature or research seminar). Ch 461/462 is offered alternate years and not offered in 2009-2010.

- Senior seminars are presented during the Academic Excellence Showcase and evaluated by a panel of judges. The panel of judges was identical for the last two years allowing direct comparison of the seminar ratings. The compilation of judging panel scores showed this year's seminars to be among the best ever presented both in the quality of the organization, oral presentation and in the area of depth of knowledge of the topic. The mean overall score was 189/200 (range 173 – 198) compared to a mean of 171/200 (range 130-192) for 2008-2009.
- The ETS Field Test for Chemistry has been administered to graduating students for the last three years.
    - The exam was administered during finals week to three graduating seniors (one Dec. 2009 graduation took the exam in June 2009) and one student graduating during winter quarter 2011. The exam results are not yet available.
    - The National norms for the 2008-2009 exam were received during 2009-2010. The mean score for all WOU students was 151 with a standard deviation =8 (total exam score range 120-200 pts). This translates to a mean institutional percentile of 60% which was very close to the results from 2008-2009 (mean score 152).
- The ETS Field Test for Chemistry is not a perfect fit assessing the WOU chemistry graduates due to the coursework differences between the two options available within the department that are necessary to provide appropriate career preparation.
- In 2010-2011, we will be switching to the American Chemical Society exit examination assessing the skills expected of an ACS certified chemist and appears to be a better tool for assessing critical thinking skills. This test requires students to apply chemical concepts from several core chemistry areas in conjunction to a given scenarios rather than the type of objective questions found in the ETS test. The test will be in its third year of national use next year.

D. Biology

- Dr. Baumgartner continued program assessment of the BI 100 series. This included a revised questionnaire with demographic and attitudinal sections, content-based questions aligned to course learning outcomes, and post-course laboratory evaluation questions (results pending).

- Dr. Baumgartner developed an online survey for GS 201 (Honors Biology) focusing on assessment of learning outcomes and student attitudes (results pending).
- Dr. Boomer and Dr. Latham developed in-depth assessment of the BI 211 sequence. This included background surveys, pre/post content tests, and post-course attitudinal assessment. A review of the results and suggested actions based on these results can be found in a Biology 211 Assessment Report submitted by Dr. Boomer earlier this year. In addition, pre/post content tests were also developed and conducted for BI 212 (Dr. Haberman / Dr. LeMaster) and BI 213 (Dr. Dutton / Dr. Howard) (results pending).
- Dr. Boomer developed in-depth assessment of the BI 318 – Microbiology for Health Sciences. This included background surveys, pre/post content tests, and post-course attitudinal assessment. A review of the results and suggested actions based on these results can be found in a Biology 318 Assessment Report submitted by Dr. Boomer earlier this year.
- Dr. Bryan Dutton designed and employed a pre-/post-course survey for BI 321 (Systematic Field Botany) and BI 371 (Structure of Seed Plants), and a post-course survey for BI 312 (Evolution) (results pending).
- Dr. Karen Haberman, in conjunction with Dr. Erin Baumgartner, developed course assessment for the BI 361 course (Marine Ecology) which included Pre-/post-course content-based questions and attitudinal surveys (results pending).
- Dr. Kristin Latham developed and administered a mid-term course evaluation for BI 311 (genetics) to gain feedback on student learning related to course objections (results pending).
- The department continued to administer the Educational Testing Service's Major Field Test in Biology and a Biology Program Exit Survey for graduating seniors (results pending).

V. SWOT ANALYSIS

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

1. Mathematics

- One of the biggest strengths of the department is the senior project, required of all mathematics majors. Although sometimes these projects do not contain original research, we continually send mathematics majors to local and national conferences to give talks. Frequently, our students win awards for their presentations. As evident by the results on the Major Field Test and the awards won at local and national conferences, we have effective degree requirements for our mathematics major. Our majors go into teaching, graduate school, and industry after graduation.
- The mathematics preparation of pre-service K – 8 teachers at Western has been recognized by the National Council on Teacher Quality. We have a fairly unique program for the preparation of middle school mathematics teachers as well, since the majority of middle school mathematics teachers outside of WOU are trained as K – 8 teachers (not enough mathematics content) or as high school teachers (not the appropriate content and not enough pedagogy). We have the perfect blend of content and pedagogy for these future middle school mathematics teachers.
- The department instills a confidence with the mathematics majors when they take MTH 311 – 312 (Advanced Calculus I – II), which is taught using the Moore Method (a deductive manner of instruction used in advanced mathematics courses). This course, usually taken during a major's senior year, requires students to prove theorems and present their proofs in front of the class at the board. We feel this method has helped students become quite comfortable at the board, which presumably serves them well once they are in the high school classroom, where the majority of our students end up. Also, in their senior year, and at various places prior, students are offered the opportunity to learn LaTeX (a typesetting program for scientific work) to help make their work look professional. This too will presumably serve them well in their future teaching.

- The department, as a whole, is highly collegial and extensively involved in the local and national mathematics community. Cheryl Beaver is the current president of TOTOM (Teachers of Teachers of Mathematics), which is an Oregon organization. Klay Kruczek is the current president of OMEC (Oregon Mathematics Education Council), the current communications office of the Pacific Northwest Section NExT, and will be the chair of the Pacific Northwest Section of the MAA beginning in June of 2011. We also give talks and chair sessions at local and national conferences.

- One of the biggest strengths for our students is our building, the Marc "Ted" Winters Building. Our mathematics majors use the two study lounges frequently to work with each other on homework and for studying for exams. It is also great to have four SMART classrooms, with one being a 40-station computer lab, and an on-site testing center.

2. Earth and Physical Sciences

The strengths of the Earth Science program are summarized as follows:

- The Earth Science program has a faculty:student ratio that is conducive to one-on-one contact, personalized instruction, and promotion of undergraduate research.
- The Earth Science program is one of the campus leaders with respect to service contributions to the Liberal Arts Core Curriculum and pre-education programs. The ES100 sequence (ES 104-105-106) that serves approximately 1400 students per year, is a common first destination for entering freshman, and has a notably high retention rate between fall, winter, and spring terms. ES100 encourages real-world problem solving and is appealing to non-science majors.
- Earth Science faculty members embrace a technology-based curriculum and are working to implement standardized program assessment tools.
- Earth Science faculty members actively serve as leaders on a number of campus-wide committees and serve in a variety of professional capacities.
- Earth Science faculty members are enthusiastically engaged in a wide spectrum of peer-reviewed research, publications, and related professional development.

The strengths of the Physics program are summarized as follows:

- The physics program offers small class size with opportunities for close student-faculty interaction. Upper level students engage in personalized independent studies.
- The physics laboratory represents a state-of-the- art active learning environment.
- Students have opportunities to participate in a wide range of activities through our affiliation with the NASA Oregon Space Grant Consortium.

3. Chemistry

- The Chemistry Department is composed of three tenured, one tenure-track, two fulltime adjuncts and two specialty adjuncts from the Oregon State Police crime laboratory. This faculty is capable and versatile with each member able to teach in more than one area within the program and is the department's most valuable resource.
- A strength of the department is the commitment of the faculty to integrate innovative activities and projects into the curriculum. Students work on research projects as part of their laboratory coursework. Faculty engage innovative use of technology including: (1) project-based content learning through video production, web authoring, computer application design; (2) use of clicker methodology to assess student learning during lecture; and (3) hands-on use of laboratory instrumentation including the opportunity to set up and learn how to operate instruments from manuals.
- WOU possesses the only program within the OUS system that is specifically designed to train students in the area of Forensic Chemistry and that involves OSP professionals to teach the techniques currently used in the working forensic lab.

- WOU chemistry graduates compete favorably for employment in the region and do well in graduate programs. We currently have four graduates performing well in their pursuit of PhD degrees at Oregon State University, the University of Utah, Oklahoma State University and the John Jay College of Criminal Justice (the foremost graduate program in forensics in the U.S.).

4. Biology

- We have a faculty strongly committed undergraduate education. Faculty are active in all aspects of the university, including teaching, university governance, and research. In addition, the entire tenure-track faculty has their terminal degree as do a majority of the non-tenure faculty.
- We have made great strides towards updating our laboratories to include modernized facilities and equipment. This has allowed for the development and introduction of cutting-edge laboratory exercises preparing students for the current job market / graduate school upon graduation from Western Oregon University.
- We have embraced the concept of program assessment and are now basing program / course changes based on empirical evidence. Currently, three faculty members are actively pursuing research in the area of program / course development and assessment with all faculty actively participating in assessment strategies.

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

1. Mathematics

- With the addition of Rachel Harrington to the College of Education a couple of years ago, we have an opportunity to collaborate with her on teaching a few more courses for in-service middle school mathematics teachers. These courses are usually primarily offered in the summer, and we have had low enrollment for these courses in the last few years. We are hoping with Rachel's involvement in the local schools, we can offer these courses more often during the regular portion of the academic year and offer courses that may appeal to the needs of these in-service teachers.
- Dean David McDonald has asked the department about our interest in participating in outreach and professional development with the mathematics teachers at McKay High School to offer a section of MTH 111 College Algebra for college credit. This is still in the early stages of planning, so we are not sure what will happen yet. It would be nice for the department to get more involved with the local community, but we have not figured out how this can work out logistically.
- We also have the potential to assist Adele Schepige with her work with PrISM Oregon. PrISM, Preparation for Instruction of Science & Math, is interested in "developing a set of exciting, inquiry-based, integrated math and science courses that feature accessibility to teachers throughout Oregon." This is still in the early stages of development, but we are looking into possibly creating new courses and / or offering online classes in mathematics for in-service teachers or trying other alternative methods of delivery of our current classes.
- The department would like to see more outreach locally. It would be great if the department had regular meaningful contact with the public schools (Central High School, Talmadge Middle School, and Ash Creek Elementary School) beyond sporadic student teaching.

2. Earth and Physical Sciences

Key opportunities for the Earth Science program include the following:

- Lower-division Earth Science enrollments have been increasing over the past 3 academic years (2006-2009). Total student credit hour production increased by 15% and ES100 enrollments by 11%. The upper-division population remains steady with a consistent number of degrees

awarded. The program is economical and efficient, with a high annual credit-hour production per faculty-staff member (~400 SCH per faculty-staff) and a low salary:SCH ratio.

- A key aspect of the program is the close alliance with faculty in physics, chemistry, biology, and education. Faculty members from different disciplines work directly together on a daily basis and cultivate a multi-disciplinary, collegial atmosphere that is unique compared to other institutions. The cross-disciplinary alliance in NSM provides a superb opportunity for faculty and students with diverse interests to interact in a rich and stimulating academic environment. Earth Science plays an important role by providing a nexus for studies in the biological and physical sciences. In this regard, Earth Science faculty are instrumental in supporting a growing alliance of NSM faculty and programs that provide integrated, interdisciplinary field-based courses and research opportunities in Natural Science disciplines. In addition, there is a common linkage between majors and minors in Earth Science, Geography, and Environmental Studies. As such, a significant number of students share common classes in each of these programs.

Key opportunities for the Physics program include the following:

- The Physics program is actively engaged in K-12 community outreach and improving science teacher training in the State of Oregon. Linkages with NASA-based grants programs provides WOU student scholarships and supports teacher training opportunities with a focus on global climate change in the Earth system. The application of Physics to real-world problems in Earth Science represents an innovative opportunity for cross-collaboration between faculty and students.

3. Chemistry

- We have the opportunity to attract students in pre-nursing by packaging current forensic course offerings as well as a new course offering in toxicology/pharmacology into a 12 hr upper division block that could be used in the nursing program (or the forensic chemistry major). Forensic nursing is a rapidly developing area in the health care industry.
- Now that the department possesses a faculty member whose specialty is biochemistry, we can upgrade our offerings in this area to prepare students for graduate work in areas such as toxicology and pharmacology.
- Continue our interaction with the OSP crime lab by integrating lab experts in our curriculum and maintaining student practica positions within the laboratory. After working with OSP professionals, our students fare well in acquiring forensic employment within the system in an area that has a limited employment market.

4. Biology

- We have observed steady growth in student numbers over the past decade. Much of the recent increase is attributed to students interested in the pre-professional health fields. Through this, the department has the opportunity to expand our pre-professional opportunities including the organization of new clubs (e.g., pre-medical club) and the development of new programs (e.g., practicum experiences).
- The diverse research background of our faculty allows for the continued development of relationships with individuals / groups outside the university. For example, discussions are ongoing concerning the development of research projects at the Luckiamute Landing and opportunities for collaborations with the Bureau of Land Management (BLM) will be examined over the 2010-2011 academic year.
- Funding opportunities for teaching / research monies outside the 'normal' channels have been met with success over the past several years (e.g., Department of Justice, Oregon SeaGrant), suggesting that monies are still available to fund smaller universities despite the current economic downturn.

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

1. Mathematics

- The department could really use another tenure-track faculty member who could teach courses in mathematics education. A few members of the department (Cheryl Beaver, Laurie Burton, and Klay Kruczek) have been the primary instructors of these classes, but they wish to have a more diverse teaching schedule. They are all trained as Ph.D. mathematicians, who enjoy teaching mathematics education classes, but would prefer to also teach any number of the service courses, calculus courses, and or courses for mathematics majors. We were hoping the addition of Mary Beisiegel would alleviate this issue, but she left us after this year. Even with Mary's help, among the four of us, we would only teach six classes that were not specifically designed for pre-service K – 8 teachers. As previously mentioned, these three faculty members would excel and help our programs expand and grow if they are not teaching only mathematics education courses.

- Over the years, we have noticed we need to offer more and more sections of MTH 70, MTH 95, and MTH 111. We cannot continue to increase the number of sections of each of these courses for a variety of reasons. First, we just do not have the classroom space on campus to increase the number of sections of each course. We have already begun to offer evening classes to free up classroom space during the day. Increasing the number of sections offered also requires the hiring of more non-tenure-track faculty members. Office space for non-tenure-track faculty is an issue in our department. The offices for these faculty members are already small. Putting two full-time faculty members in an office just does not seem appropriate, although we did do it last year because one of the faculty members was willing to conduct office hours outside of his office when possible.

- 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. In particular, as a department, each of us averages over one publication per year. What makes this even more impressive is that there is a turnaround time of over a year per submitted paper for some of the mathematics journals we publish in.

2. Earth and Physical Sciences

Three primary challenges to advancing the Earth Science program at WOU include: (1) over-dependence on adjunct faculty and lack of tenure-line positions, (2) limited faculty time available for scholarly activities, program assessment, and faculty development, and (3) student enrollment and retention.

- The primary challenge facing the Department of Earth and Physical Sciences is the over-dependence on adjunct faculty and lack of tenure-line positions compared to other departments in the division. The adjunct faculty ratio in Earth Science ranges up to 65%, almost double that of other NSM Division programs. The Earth Science program is currently in need of at least one tenure-track faculty position. Adjunct pay levels, teaching loads, and contract procedures at WOU are such that there is relatively high turnover in these positions, which ultimately destabilizes curricular programs and inhibits long-term development. Institutional stability, continuity, and future growth are dependent upon the stock of tenure-line faculty. Adjuncts represent short term investments with high turnover rate and curricular instability. Not only do tenure-track faculty members add to the vitality of individual courses and program curricula, they also represent an institutional investment in advanced levels of service, scholarship, and grant writing that is not typically possible for adjunct instructors. The Earth Science program is challenged by this instability.

- An ongoing challenge is also associated with the teaching load required of faculty. The standard teaching assignment requires 12 contact hours per week (36 FTE contact hours per academic year), with lecture hours counting for 1 FTE contact and lab hours counting for 0.66. The teaching load combined with maximum-capacity class sizes results in little time available for

other faculty duties such as scholarly research, program planning / assessment, and professional service. As such, the bulk of the latter activities must be conducted after hours, on weekends, and during the summer. An additional challenge presented by the relatively high teaching load is that associated with depletion of creative energy and "teacher burnout".

- Student enrollment and retention is an ongoing challenge at all levels of the University, including the Earth Science program. While Earth Science 100-level course enrollments are increasing, the numbers of majors have been relatively steady, and growth has been slower than expected. The 100-level enrollment trends in large part mirror that of the university as a whole. The most significant challenge to growth of the Earth Science program results from the general lack of geology/Earth Science in the high school curriculum at the state level. In the state of Oregon, K-12 Students are only required to take Earth Science in 8th grade. Geology-related course offerings at the high school level occur sporadically on a district-by-district (teacher to teacher) basis, and are not prominently required in the same way as chemistry, biology, or physics. This deficiency is notable given the prominent role that the geosciences are currently playing in the state and national dialogue about oil and gas resources, energy production, water supplies, sustainability, and global climate change. The lack of an advanced placement (AP) test in Earth Science and absence of an explicit Oregon teaching endorsement are exacerbating factors. The net result is that students receive minimal exposure to Earth Science or Geology in high school, with little understanding of career options or the importance of Earth Science to natural resources issues in the state of Oregon. This deficiency propagates as students enter college, thus stagnating opportunities for freshman enrollment growth.

Physics program challenges include the following:

- The most urgent challenge faced by the physics program is the lack of a second tenure line which limits the ability to offer upper division courses and to plan for programmatic upgrades. The physics program is caught in a classic "Catch-22" predicament. Low enrollment in upper level physics courses ensures departmental and division discussions for future hires go to disciplines other than physics. The lack of a major in physics, and regular upper level course offerings prevent the already small number of interested students from actually choosing physics. Student enrollment numbers in physics courses outside of require engineering coursework across the country have been low for many years now, and is likewise manifested at WOU.
- A high number of weekly student contact hours (typically 15-16) prevents faculty from fully engaging in scholarly and professional activities.
- Another challenge involves entering students who are ill-prepared for the quantitative problem solving demands that a university level physics class thrusts upon them.

3. Chemistry

- Finite resources for maintenance of the Department's instrument holdings and upgrading of instruments to state-of-the-art models and acquisition of expensive forensic instrumentation and basic chemical instrumentation such as a nuclear magnetic resonance spectrometer. Such instrumentation frequently costs in excess of $100,000 for the initial purchase and brings with it ongoing operational costs.
- There is a limited market demand for forensic specialists. This challenge is met within the curriculum by providing students in the forensic major with the skills needed to be marketable as chemists.
- To accommodate the continuing growth of the Ch 100 sequence to meet the demand of the pre-nursing program without sacrificing in other programmatic options.
- We identified one weakness in the area of Quality Assurance/Quality Control within our curriculum. This is an area which would make our students more desirable to potential employers.

4. Biology

- Although listed above as an opportunity, the increase in student growth over the past decade is also a major challenge for the department. Space issues are becoming a major concern for the department in terms of classroom availability, office / research space, and equipment storage.
- Adequate monies to support classroom / research activities continue to be a challenge. Recent monies through the stimulus plan have greatly assisted in laboratory remodels / equipment purchases but future projects suggest that these will not remain into the new biennium.
- Increases in faculty responsibilities outside the classroom continue to be a challenge. Increased advising loads, committee assignments, and university events often lead to less time available to devote to teaching / research obligations.

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

1. Mathematics

- 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. We were hoping Mary Beisiegel would be that person, since she has a M.S. Statistics, but alas she left to pursue other interests.
- In the next few years, we expect the departure of a few of our non-tenure-track faculty members. In particular, we need another experienced teacher of MTH 105, since the only person who teaches this course (Dennis Spencer) plans on retiring in the next couple of years. If we were to add another tenure line, this new hire could fill one of our major gaps in mathematics education, statistics, and mathematics for liberal arts majors.

2. Earth and Physical Sciences

Vulnerabilities for the Earth Science and Physics program are summarized as follows:

- The Earth Science program, along with others in the division, lacks a consistent source of funding for large-scale instrumentation and facility infrastructure. While we have worked diligently to upgrade and support laboratory infrastructure, the Earth Science program still lags behind other science program areas in terms of modern laboratory equipment and resources.
- While the need is clearly documented by staffing and enrollment data, there is a notable lack of institutional commitment to securing a long overdue tenure-line addition of an Earth and Physical Science education specialist, comparable to that recently added to the Biology faculty complement.
- The primary vulnerability for the Physics program is lack of office space, course-load equivalency and adequate long-term funding for a second tenure-line physicist.

3. Chemistry

- Having to rely on adjunct personnel in meet the demands of pre-nursing program. This reliance places us in jeopardy due to the volatile nature of such teaching positions. For example, we lost one excellent adjunct instructor when a more lucrative industrial position became available during the 2009-2010 academic year.
- Added pressures to maintain enrollments in upper division electives. Cancelling courses that are offered in alternate year modes is damaging to students in programs such as the Environmental Studies minor and removes the ability of students to explore some of the non-core areas of chemistry. Students have commented that they do not want to register for some upper division electives due to the fear of those courses being cancelled.

4. Biology

- Increases in student growth also represent a major vulnerability to the biology department. Increases in faculty positions have not kept pace with increases in student numbers. We believe that the department has been able to build a strong reputation across the state in recent years for our programs but without investing in additional faculty positions, we foresee drops in recruitment and retention as we increase class sizes, reduce class availabilities, and potentially cut program offerings.
- We have prided ourselves on offering a broad training in the field of biology for undergraduates. The increase in students solely interested in the pre-professional health fields is slowly eroding the ability of the department to keep a generalized curriculum in the face of such a specialized need.
- The recent investment of monies to laboratory upgrades leads to a vulnerability of not being able to fully utilize the facilities / equipment if monies are not available for upkeep / supplies.

VI. OTHER PROGRAM PLANNING AND INITIATIVES

A. Mathematics

- We are looking into slightly modifying our Applied Mathematics major because we feel that there are not enough proof-based classes in it currently.
- If we were to get an additional hire with a specialty in statistics, we would look into creating a program to train future actuaries and statisticians.

B. Earth and Physical Sciences

- The Earth Science Program prepared and submitted a 5-year program review to the Oregon University System in August 2010.

C. Chemistry

- The ETS Field Test for Chemistry is an imperfect instrument for assessing the quality of WOU chemistry graduates due to the coursework differences that are necessary to provide appropriate career preparation in the traditional chemistry and the forensic chemistry programs. Students in both options complete the same core requirements of general, organic and analytical chemistry. The students in the traditional option complete a three-term sequence in physical chemistry. Those in the forensic option take a one-term course in that discipline and are required to complete two terms of biochemistry. Biochemistry is a potential elective for the traditional majors and many students opt to take electives in other areas. All students are exposed to basic inorganic chemistry in the general chemistry sequence and more in depth coursework in this area is an elective available to students in either option, but is not a core requirement. The ETS exam major field test covers the areas of inorganic, analytical, organic, physical and biochemistry so we expect some lowering of scores in physical chemistry for students in the forensic option and in biochemistry for those in the traditional option who have not elected to take biochemistry. Scores in inorganic chemistry might be expected to be higher for those students who have opted to take elective courses in that discipline.

  Initiative: At the conclusion of the 2010-2011 academic year, administer the ACS Diagnostic of Undergraduate Chemistry Knowledge Exam that is designed for use at the end of an undergraduate chemistry major to assess the skills expected of an ACS certified chemist. Rather than being an exam that asks unrelated objective chemistry questions as the ETS exam does, the ACS exam is composed of a number of scenarios about which students answer questions. This test requires students to apply chemical concepts from several core chemistry areas to a given scenarios. The solving of problems within different scenarios test critical thinking skills. This test will be in its third year of national use next year and the results will be able to be analyzed

locally and compared to national norms. We are also considering attachment of a graduation requirement to the exit exam for majors and add the description of the requirement to the university catalog. This approach may include placing a minimum percentile score for graduation or having the percentile score attained permanently affixed to the student's transcript.

- We have administered the ACS exam for organic chemistry at the end of the three-term sequence to assess the learning of WOU students relative to national norms for more than five years. We plan to review a series of assessment exams available for measuring learning relative to national norms for other courses in our program. We will evaluate how closely those exams align to the course content taught in the 10-week quarter system as most exams are geared for the 15 week semester system. The ACS assessment exams are available for the following course offerings: General Chemistry (for Ch 200 sequence), Biochemistry, Analytical Chemistry, Instrumental Analysis, Physical Chemistry.

- Investigate possible ways to assess skills of students seeking entrance to the 100 and 200 sequences. Planning: We will review commercially available diagnostic exams such as the California Chemistry Diagnostic Test for Undergraduate Placement (diagnostic placement exam created by faculty from the University of California) and the Toledo Exam (an exam in three parts assessing math competency, general chemistry knowledge and specific primarily descriptive chemistry knowledge). We will also investigate the creation of a WOU specific exam.

- Evaluate the Forensic Chemistry Option curriculum to ensure that the coursework provided at WOU follows the American Academy of Forensic Sciences (AAFS) guidelines. Ultimately, we plan to apply for accreditation of our program from the AAFS.

- Seek a more multiculturally diverse student population within our programs. Initiative: we plan to write a Chavez grant for funding to do outreach within the Hispanic community

D. Biology

- Currently, there are no program plans / initiatives on the table although the department will be having a work retreat early in September at which time the program will be evaluated in light of the current environment.

- Biology discussions are also ongoing concerning the remodeling of NS 201 (microbiology laboratory), the laboratory prep spaces, and the development of a "large" equipment room to free up space in the laboratories, prep rooms, and research spaces.

VII. PUBLIC RELATIONS ITEMS FOR PROGRAM PROMOTION

A. Mathematics Department

- Sonia Kovalevsky Day: The Math Dept sponsored its 6th 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.

Student Achievement:

- Since August 2009, our mathematics majors have given talks at MathFest 2009 and MathFest 2010 (the annual summer conference of the MAA), the annual meeting of the Pacific Northwest section of the MAA, and the Northwest Undergraduate Mathematics Symposium. At MathFest 2009, Masaki Ikeda (BS 2009) won an award funded by the American Mathematical Society for excellence in student exposition and research. At the Second Annual Northwest Undergraduate Mathematics Symposium, held at Oregon State in April 2010, Laura Waight (BS Math 2010) won the Best Short Talk Award, Nick Gard (BS Math 2010) won the Pi Mu Epsilon Award, and Mitch Staehle (BS Math 2010) won the SIAM Award. Two mathematics majors, Jason Bathke and

Heather Johnston, have been accepted to the 2010 Pre-REU on Signal and Image Analysis at the Texas A&M University. Major Field Test: In 2009 and 2010, the mathematics majors scored in the 90% percentile on the Mathematics Major Field Test, put out by ETS.

Faculty Achievement:

- Klay Kruczek is the chair of the Oregon Mathematics Education Council and is chair-elect of the Pacific Northwest Section of the Mathematical Association of America.
- Laurie Burton is the co-author for the eighth edition of the Mathematics for Elementary Teachers: A Conceptual Approach textbook and the eighth edition of the Mathematics for Elementary Teachers: Activity Approach workbook published by McGraw Hill January 2010. The ninth edition has a publication date of January 2012.

B. Earth and Physical Science Department

- Three WOU Earth Science majors were recently awarded research funding under the supervision of Dr. Steve Taylor, Professor of Geology. Kelsii Dana, Earth Science major, received a 2010-2012 Undergraduate Research Fellowship for $45,000 from the U.S. Environmental Protection Agency. The title of her project is: "The Distribution and Occurrence of Nitrate in Groundwater Supplies of the Mid-Willamette Valley: Implications for Water Resources Management in the Monmouth-Independence Area, Oregon". This is the first such EPA award granted in the State of Oregon and these levels of undergraduate research support for an individual science student is unprecedented at Western Oregon University. Two other Earth Science majors are actively engaged in research grant projects from the 2010 NASA Oregon Space Grant: (1) Ryan Stanley received $5000 of support for a project entitled: "Land Cover Analysis Utilizing Aerial Photography, Remote Sensing and Geographic Information Systems: Application to Riparian Zones in the Mid-Willamette Basin, Oregon"; and (2) Brandon Snook applied for funds to support a project entitled: "Comparative Hydrogeomorphic Analysis of Western Oregon Watersheds Using Airborne Laser Swath Altimetry (LIDAR)".

C. Chemistry Department

- WOU chemistry graduate Alvin Gatimu (2008), currently a second year chemistry graduate student at Oregon State University, coauthored a paper entitled "Verwey-type transition within the Pb3RH7-xMnxO15 Solid Solution" which appeared in The Journal of Solid State Chemistry. This paper was deemed sufficiently significant to be the cover story of the April issue of this prestigious journal.

D. Biology Department – No Submission

E. Division of Natural Sciences and Mathematics

The Division of Natural Sciences and Mathematics extensively participated in the May 2010 Academic Showcase event sponsored by the WOU Program for Undergraduate Research (PURE) and Phi Kappa Phi. NSM Division faculty and student participation has grown over the past five years of the event. This year's tally included a total of 75 oral and poster presentations, with 51 student authors/co-authors from Mathematics, 25 from Earth Science, 7 from Chemistry, 8 from Biology, and 8 from the General Science Honors class. The program was well received by the WOU campus community. Faculty members Bryan Dutton from Biology and Jeff Templeton from Earth Science have provided dedicated leadership for Academic Showcase planning and operations, since it's inception in 2006.

WOU NATURAL SCIENCE FACULTY AWARDED NATIONAL INSTITUTE OF JUSTICE GRANT

MONMOUTH – Several faculty members in the Division of Natural Sciences and Mathematics at Western Oregon University (WOU) have received a two-year, $685,754 grant from the U.S. National

Institute of Justice (NIJ). The project is entitled “Application of Spatial Statistics to Latent Print Identifications: Towards Improved Forensic Science Methodologies” and begins in January 2010.

The purpose of the project is to critically examine the current practice of fingerprint comparisons and apply principles of spatial analysis to develop standardized probability measures. The goals are to evaluate fingerprint characteristics using established techniques in spatial statistics, develop robust probabilistic models to quantitatively validate latent print methodologies, and integrate results with field applications in the State of Oregon.

Co-principal investigators are Dr. Steve Taylor, professor of geology (WOU), and Dr. Emma Dutton, quality assurance manager at the Forensic Services Division of the Oregon State Police and an adjunct assistant professor in the Biology Department. Taylor has a background in geographic information systems (GIS) and is currently serving as the chair of the Division of Natural Sciences and Mathematics. The project director, managing daily research operations, is Pat Aldrich. Aldrich is finishing his doctoral dissertation in community ecology at the University of Hawaii-Manoa and has extensive experience in biostatistics. The fourth team member is research associate Dr. Bryan Dutton, a professor of biology at WOU. Bryan Dutton is a plant systematist and is trained in morphological analysis. In addition to the core team of project scientists, a portion of grant funds are dedicated to engaging WOU students as research assistants. This type of applied research provides an excellent framework for training young Oregonians in scientific principles with an emphasis in spatial analysis and biometrics.

A synopsis of the grant solicitation reads as follows: “The U.S. Department of Justice, Office of Justice Programs, National Institute of Justice is seeking applications for funding research to improve the understanding of the accuracy, reliability, and measurement validity of forensic science disciplines. Research studies should focus on expanding the scientific basis of forensic methods, development of quantifiable measures of the reliability and accuracy of forensic analyses, and development of an understanding of human factors that may affect forensic analyses. This program furthers the Department’s mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels.”

APPENDIX 1. 2009-2010 NSM DIVISION FACULTY AND STUDENT HIGHLIGHTS

I. FACULTY AND STAFF ROSTER

A. Staff:

Sharon Clinton, Laboratory Preparator, Chemistry
Julie Grammer, Laboratory Preparator, Biology-Earth Science
Piper Mueller-Warrant, Laboratory Preparator, Biology
Sharyne Ryals, Mathematics Office Specialist
Niki Winslow, Administrative Program Coordinator

B. Mathematics Faculty:

Tenure-Tenure Track

Cheryl Beaver, PhD, Associate Professor
Scott Beaver, PhD, Associate Professor
Hamid Behmard, PhD, Professor
Laurie Burton, PhD, Professor
Klay Kruczek, PhD, Associate Professor
Mike Ward, PhD, Professor

Non-Tenure Track

Cathy Aune, M.S., Instructor
Avery Cotton, M.S., Instructor
Nicholas Husen, M.S., Instructor
Stanley Leung, Instructor
Dennis Spencer, Instructor

C. Earth and Physical Sciences Faculty:

Tenure-Tenure Track

Jeff Myers, PhD, Professor
Bill Schoenfeld, PhD, Associate Professor
Steve Taylor, PhD, Professor
Jeff Templeton, PhD, Associate Professor and Department Chair

Non-Tenure Track

Karen Brown, M.S., Instructor
Don Ellingson, M.S., Instructor
Jeremiah Oxford, M.S., Instructor
Grant Smith, M.S., Instructor
Phillip Wade, M.S., Instructor
KC Walsh, PhD, Assistant Professor

D. Chemistry Faculty:

Tenure-Tenure Track

Arlene Courtney, PhD, Professor and Department Chair
Patty Flatt, PhD, Assistant Professor
Rahim Kazerouni, PhD, Associate Professor
Pete Poston, PhD, Professor

Non-Tenure Track

Sam Cole, PhD, Assistant Professor
Spence Russell, M.S., Instructor
Sara Short, Instructor, Oregon State Police
Tom Barnes, Instructor, Oregon State Police

E. Biology Faculty

Tenure-Tenure Track

Erin Baumgartner, PhD, Assistant Professor
Sarah Boomer, PhD, Professor
Bryan Dutton, PhD, Professor
Irja Galvan, PhD, Associate Professor
Karen Haberman, PhD, Associate Professor
Ava Howard, PhD, Assistant Professor
Kristin Latham, PhD, Assistant Professor
Mike LeMaster, PhD, Associate Professor and Department Chair

Non-Tenure Track

Pat Aldrich, M.S., ABD, Instructor, Research Associate
Karen Bledsoe, PhD, Assistant Professor
Emma Dutton, PhD. Assistant Professor, Research Associate, Oregon State Police
Scott Macdonald, M.S., Instructor
Jeff Snyder, PhD, Assistant Professor

II. FACULTY HIGHLIGHTS

A. Teaching

1. Mathematics

- Scott Beaver 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.
- Scott Beaver, Cheryl Beaver, and Klay Kruczek attended the annual meeting of the Pacific Northwest Section of the Mathematical Association of America (MAA) (in Seattle, WA during April 2010) with two mathematics majors (Dania Morales and Danny Corliss), who each presented a talk at the conference.
- 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.

2. Earth and Physical Science

- Jeff Myers: conducted a field trip and incorporated microscopy into the ES392 curriculum; developed personalized curriculum approaches for ES407 Senior Seminar; completed syllabi reformatting in alignment with best practices at Cal State University, Monterey Bay.
- Steve Taylor: Advanced integration of Moodle and Classroom Response Systems (“clickers”) into the ES202 curriculum.
- Jeff Templeton: Conducted a two-day field trip to Sunset Bay/Cape Arago and the Roseburg area for ES 321.
- Phil Wade: Revised the GS313/312 curriculum in response to Oregon Dept. of Education Core Science Standards Revisions; new course development in GS203 with increased integration of multi-media technology into student course outcomes; designed new course GS325 with Erin Baumgartner as part of the changes to the COE Teacher Preparation program.

3. Chemistry

- Patricia Flatt made substantial revisions to the existing laboratory sections for CH106. This included the introduction of two new laboratory experiments to the course and revision of several existing sections. The two new laboratory sections include an experiment ‘Investigating the Activity of Enzymes’ and an experiment entitled, ‘DNA Isolation from Wheat Germ’. These

changes were the beginning of alterations to the curriculum to accommodate the pre-nursing and forensic minor student populations. She also introduced the use of clickers for assessing student learning of presented material in the lecture part of the course.

- Arlene Courtney and Phillip Wade collaborated in the use of project based learning in GS 203H (the LACC science course for honors students which is taught jointly through the Department of Earth and Physical Science and Chemistry). The course was taught using a Moodle framework and incorporating many Web 2.0 skills including the use of a wiki for collaborative student project development. Pairs of students created video documentaries of approximately 10 minute duration. These documentaries were aired in a public forum during the Academic Excellence Showcase. During this course extensive use was made of knowledge surveys. The data collected from these surveys will be used as part of a research publication on use of video production for teaching science. A poster session presentation is planned for the American Geophysical Union's Fall 2010 meeting.

4. Biology

- Dr. Erin Baumgartner and Dr. Bryan Dutton reviewed various iteration of the college of education proposed curriculum changes with feedback provided to the NSM division.
- Dr. Baumgartner worked extensively with collaborators in the Division of Natural Sciences and the College of Education on the formation of a new science education course, GS 325. In addition, Dr. Baumgartner represented WOU College of LAS at a OUS Compass conference – a planning conference to develop a future OUS-wide conference to help align assessment of student learning at all OUS schools.
- Dr. Karen Haberman substantially revised her BI 361 (Marine Ecology) course to include students in her research of the Salmon River estuary funded through Oregon Sea Grant.
- Undergraduate students participated in collaborative research with multiple faculty including Dr. Irja Galvan (Michael Petrovich), Dr. Karen Haberman (Dan Keller, Joe Lewis, Stephanie Hendrix), Dr. Mike LeMaster (Rachel Hermason), and Dr. Jeff Snyder (Sarah Cole, Patrick Grennan, Joe Lewis).
- Dr. Karen Bledsoe received the Fred Fox Distinguished Service to Science Education award through the Oregon Science Teachers Association.

B. Scholarship

1. Mathematics

Publications:

C. Beaver, Burton, Kruczek and Fung (Worchester 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. We continue to work on this volume; work summer 2010 will include our third review of submitted articles and overall design of manuscript.

C. Beaver and Kruczek, "The Mathematics for Middle School Teachers Program at Western Oregon University**,"** In progress as part of MAA Notes book. This paper has been extensively peer reviewed by the MAA Notes board, in addition to the Burton, Beaver, Kruczek and Fung work.

C. Beaver, "Identification of Error Types in Preservice Teachers' Attempts to Create Fraction Story Problems for Specified Operations" accepted to School Science and Mathematics. (co-authored with Cheryl McAllister, Southeast Missouri State University).

Burton and Kruczek, "Visual College Algebra for Teachers", In progress as part of MAA Notes book. This paper has been extensively peer reviewed by the MAA Notes board, in addition to the Burton, Beaver, Kruczek and Fung work.

Burton, "Mathematics for Elementary Teachers: A Conceptual Approach," ninth edition, Burton co-author 8e (2010) and 9e (2012), 9e will be published January, 2011 with a publication date of 2012.

Burton, "Mathematics for Elementary Teachers: An Activity Approach," ninth edition, Burton co-author 7e (2007), 8e (2010) and (9e 2012), 9e will be published January, 2011 with a publication date of 2012.

Kruczek, "Potential-Based Strategies for Tic-Tac-Toe on the Integer Lattice with Numerous Directions," *The Electronic Journal of Combinatorics*, 17(1), 2010 (co-author Eric Sundberg, Occidental College)

Ward, "On Minimal Non-p-closed Groups and Related properties," to appear in *Publicationes Mathematicae Debrecen*, 2011. (with L. C. Kappe, G. Mendoza, and M. Mazur), "Cosets and Cayley-Sudoku Tables," *Mathematics Magazine*, April 2010. (with WOU math major graduates Jen Carmichael '06 and Keith Schloeman '07)

Presentations:

C. Beaver, Burton, and Kruczek, *Active Learning Approaches for the Foundational Mathematics for Elementary Teachers Courses*, Four hour "minicourse", AMS/MAA Joint Mathematics Meetings, San Francisco, CA, January 15 (two hours) and January 16 (two hours), 2010

C. Beaver, S. Beaver, *The Natural Role of the Sequences and Series Calculus Course*, MAA MathFest, Portland, OR, August 2009

C. Beaver, *Breaking the STEM Barrier: Sonia Kovalevsky Day*, invited presentation to the American Association for University Women (AAUM), Salem, OR, September 2009

C. Beaver, (Invited) Panel member on Panel for Outreach, Regional MAA Conference, Seattle, WA, April 2010

S. Beaver, *Does Peer Assessment Help Improve Mathematical Writing for Pre-Service Elementary and Middle School Teachers?* (with Cheryl Beaver), AMS/MAA Joint Mathematics Meetings, San Francisco, CA, January 2010

S. Beaver, *The Fourier Transform, $L^2(R)$, and The Riemann-Lebesgue Lemma*, at the PNW-MAA Regional Meeting, Seattle, WA, April 2010

Beisiegel, *Rethinking teacher education for mathematics graduate students*, AMS/MAA Joint Mathematics Meetings, San Francisco, CA, January 2010

Beisiegel, *Being (almost) a mathemtician: Teacher identity in post-secondary mathematics*, Canadian Mathematics Education Study Group conference at Simon Fraser University, Burnaby, British Columbia,. May 2010

Burton, *Mathematics for Elementary Teachers: Using Virtual Manipulatives*, Mathfest MAA Conference, Portland, Oregon, August 2009

Kruczek, *Mathematics Teacher Development through Virtual Fieldwork*, Association of Mathematics Teacher Educators Conference, Irvine, CA, January 2010

Kruczek, *Potential-Based Strategies for Breaker for Maker-Breaker Tic-Tac-Toe on the Integer Lattice with Numerous Directions*, AMS/MAA Joint Mathematics Meetings, San Francisco, CA, January 2010

Ward, *On solvable minimal non-p-closed and non-p-exponent closed groups*, Joint Mathematics Meetings, San Francisco, CA, January 2010

Ward, *Cayley-Sudoku Tables*, Willamette University Colloquium, April 2010

Ward, *A Question on Transversals Arising from Cayley-Sudoku Tables*, XXXth Ohio State-Denison Mathematics Conference, Columbus, OH, May 2010

2. Earth and Physical Science

Reports and Publications:

Myers, J.A., Pratt, A.R., Buche, M.V., 2009. Paleontological Resource Impact Mitigation Program, Final Technical Report of Results and Findings. Prepared in support of Antelope Valley Recycling and Disposal Facility, Inc., Landfill II, Phase V (VA-1 and VA-2) Palmdale, Los Angeles County, California, Prepared for Paleoenvironmental Consultants, Altedena, California.

Dillhoff, R.M., Dillhoff, T.A., Dunn, R.E., **Myers, J.A**., and Strömberg, C.A.E., 2009, Cenozoic Paleobotany of the John Day Basin, central Oregon, in O'Connor, J.E., Dorsey, R.J., and Madin, I.P., eds., Volcanoes to Vineyards: Geologic Field Trips through the Dynamic Landscape of the Pacific Northwest: Geological Society of America Field Guide 15, p. 135–164

Winningham, Robert G., **Templeton, Jeffrey H.,** Dutton, Bryan E., and Scheck, Stephen H., 2009, A grassroots, faculty-driven initiative to institutionalize undergraduate research: The ins and outs of cultivating administrative support: Council on Undergraduate Research Quarterly, v. 30, p. 29-34.

Taylor, S.B. *to appear*, The Occurrence of Small-Scale Debris Fans in Sandstone Landscapes of the Central Appalachians: Case-Study Supplement to accompany the "Key Concepts in Geomorphology" textbook by P. Bierman and D. Montgomery, W.H. Freeman Publisher.

Taylor, S.B. *to appear*, Volcanic History and Cinder Cone Erosion at Newberry Volcano, Oregon: Case-Study Supplement to accompany the "Key Concepts in Geomorphology" textbook by P. Bierman and D. Montgomery, W.H. Freeman Publisher (anticipated release date Fall 2010).

Presentations:

Myers, J.A. served as field trip leader, Cenozoic Paleobotany of the John Day basin, Central Oregon. Geological Society of America 2009 Annual Meeting in Portland, OR.

Taylor, S.B. Fall 2009, "Geology, Geomorphology and Hydrology of the Luckiamute Watershed, Central Oregon Coast Range", Willamette University Institute for Continued Learning (invited talk).

Taylor, S.B., Fall 2009, "Just the Facts: Licensing, Compliance, & the Role of the State Board of Geologists: Applications to the Water Resources Profession in Oregon", Oregon State University, Water Resources Graduate Program, Fall Seminar Series (invited talk).

Stanley, R., and **Taylor, S.B**., 2009, Land Cover Analysis Utilizing Geographic Information Systems and Historic Aerial Photography: A Case Study of Riparian Zones in the Luckiamute River Basin, Central Oregon Coast Range: Abstracts with Programs, Geological Society of America, v. 41, n7.

Taylor, S.B., Stanley, R., MacNab, I, and Dutton, B., 2009, Historic Land-Cover Analysis of The Luckiamute River Basin, Central Oregon Coast Range: Preliminary Results from the Earth Science Program for Undergraduate Research at Western Oregon University: Abstracts with Programs, Geological Society of America, v. 41, no. 7.

Dutton, E., **Taylor, S.B.,** Aldrich, P., and Dutton, B., 2010, Application of Spatial Statistics to Latent Print Identifications: Towards Improved Forensic Science Methodologies: General Forensics R&D Grantees Meeting, Proceedings of the American Academy of Forensic Sciences, v. 16, Seattle Washington.

Aldrich, P., **Taylor, S.B.,** Dutton, E., and Dutton, B., 2010, 2010, Application of Spatial Statistics to Latent Print Identifications: Proceedings of the International Association for Identification, Spokane, Washington.

Dutton, E., Aldrich, P., **Taylor, S.B.,** Dutton, E., 2010, NIJ Project Status Report – Application of Spatial Statistics to Latent Print Identifications: Proceedings of the Automated Fingerprint Identification Systems (AFIS) 24th Annual Users Conference, Portland, Oregon.

Templeton, Jeffrey H., 2009, Geochemical constraints on the evolution of a subduction-related, rear-arc continental magma system: Newberry Volcano, central Oregon: Geological Society of America Abstracts with Programs, v. 41, p. 63.

Templeton, Jeffrey H., Winningham, Robert G., Dutton, Bryan E., and Scheck, Stephen H., 2010, PURE@WOU: Developing and implementing the Program for Undergraduate Research Experiences at Western Oregon University: Council on Undergraduate Research National Conference Proceedings.

Aas, Tanja and **Wade, Philip** (2009) Google Earth in the K-8 Classroom: Geological Society of America Abstracts with Programs, Vol. 41, No. 7, p. 318.

Grants and Funding:

Myers, J.A., WOU Faculty Development Major Research. Description of an Articulated Fruiting Head of Securidaca (Polygalaceae) from the Latest Eocene Badger's Nose Flora of NE California, $2100.00
Myers, WOU Faculty Development Travel Funds $730.00

Taylor, S.B., Fall 2009, U.S. Environmental Protection Agency, Greater Research Opportunities (GRO) Fellowship for Undergraduate Environmental Study: "The Distribution and Occurrence of Nitrate in Groundwater Supplies of the Mid-Willamette Valley: Implications for Water Resource Management in the Monmouth-Independence Area, Oregon" (Co-PI and faculty supervisor for K. Dana, WOU Student, $45,100, awarded).

Taylor, S.B., Winter 2010, NASA Oregon Space Grant: "Land Cover Analysis Utilizing Aerial Photography, Remote Sensing and Geographic Information Systems: Application to Riparian Zones in the Mid-Willamette Basin, Oregon" (Co-PI and faculty supervisor for R. Stanley, WOU Student, $5000, awarded).

Taylor, S.B., Winter 2010, Myer Memorial Trust and Oregon Watershed Enhancement Board (OWEB) Special Investments Partnership Program: "Hydrogeologic Assessment and Aquifer Characterization at the Luckiamute State Natural Area" (Taylor PI with WOU student assistants, $25,000, review pending)

Taylor, S.B., Spring 2010, Contract Agreement Upper Nehalem Watershed Council: "GIS Analysis and Results from Rapid Bio-Assessment (RBA) and Limited Factors Analysis (LFA) in the Upper Nehalem Watershed, Tillamook County, Oregon" (PI with WOU student assistants, $17,000, awarded).

Taylor, S.B., Spring 2010, NASA Oregon Space Grant: "Comparative Hydrogeomorphic Analysis of Western Oregon Watersheds Using Airborne Laser Swath Altimetry (LIDAR)" (Co-PI and faculty supervisor for B. Snook, WOU Student, $5000, review pending).

Templeton, J.H., Taylor, S.B., Wade, P., and Carter, D., Spring 2010, Transforming Undergraduate Earth System Science Curricula through Inquiry-Based Learning-for-Use Modules, National Science Foundation – Transforming Undergraduate STEM Education Program, $249,657, pending review.

Templeton, J.H., Electron Microprobe Analysis of Pleistocene Ash-flow Tuffs at Newberry Volcano, Oregon: Fine-scale Compositional Constraints on the Evolution of a Continental Silicic Magma System, WOU Faculty Development Research / Major Project Grant, $2250.

Templeton, J.H., WOU Faculty Development Grant and other Travel Funds, Attend Geological Society of America Field Trip to Long Valley Caldera, CA, $2100.

3. Chemistry

Reports and Publications:

Andrianasolo, E., **Flatt, P.M.,** McPhail, K.L., Simmons T. L., and Gerwick, W.H. (Accepted) Pivitol Connections: Tracing Support by the Natural Products Branch to Drug Discovery from Marine Organisms. *Proceedings of the Gordon Cragg Symposium*.

Fotso, S., Zabriskie, T.M., Proteau, P.J., **Flatt, P.M.**, Santosa, D.A., Sulastri, and Mahmud, T. (2009) Limazepines A-F, Pyrrolo[1,4]benzodiazepine Antibiotics from an Indonesian *Micrococcus* sp. *J. Nat. Prod.* 72(4): 690-695.

Wu, X., **Flatt, P.M.**, and Mahmud, T. (2009) Biosynthetic gene cluster of Cetoniacytone A, an unusual aminocyclitol from the endosymbiotic bacterium, *Actinomyctes* sp. LU9419. *ChemBioChem* 10(2):304-314.

Poston, P., Submitted a project report to the National Park Service (NPS) entitled "Final Report: Raman Spectroscopic Analysis of Rock Art Pigment from the Great Gallery, Maze District, Canyonlands National Park, Utah" an participated in the filming of a National Geographic Special highlighting this rock art. This report will be reformatted as a journal publication to be sent to *Applied Spectroscopy*

Presentations:

Flatt, P.M, and Mahmud, T. (2010) IDENTIFICATION AND FUNCTIONAL ANALYSIS OF THE PYRALOMICIN BIOSYNTHETIC GENE CLUSTER. Oral Presentation at the Oregon Academy of Science 69th Annual Meeting, Concordia University, Portland, OR.

Poston, P., Attended the Society of Western Analytical Professors held at the University of Utah Chemistry Department last Fall presenting the results of the rock art research.

Grants and Funding:

Flatt, P.M., Collaborative Research: Characterization Of The Ring Cyclization Reaction Mechanism During Pyralomicin Biosynthesis **–** Joint grant proposal with Professor Mahmud from the College of Pharmacy at Oregon State University. Submitted in Jan 2010 to NSF requesting $98,986 over 3 years. Currently pending review.

Flatt, P.M., Development Of Online Resources To Enhance Remote/Distance Learning Options In The Health And Natural Sciences **–** Joint grant proposal with Professor Allen in the Physical and Health Science Division. Submitted to the Student Technology Committee at WOU. Awarded in the amount of $650.00

Flatt, P.M. and Latham, K., Acquisition Of A Shaker Incubator To Enhance Resources Available For Biochemical And Molecular Research. Joint proposal to the Academic Infrastructure Committee at WOU submitted by Prof. Flatt (Chemistry) and Prof Latham (Biology) to enhance independent research projects and several existing biology and chemistry laboratory courses. Awarded to the Department of Chemistry in the amount of $9,500.

Poston, P., Received a Category 3 Major Research Faculty Development grant funding another project with NPS regarding the radiometric dating and search for impact-related nanodiamonds and Iridium that may have been created by an extraterrestrial comet strike that is theorized to have put an end to the Clovis Period of habitation ending approximately 13 ka ago.

4. Biology

Book Chapters:

Duncan, K.D., and **Baumgartner, E.** (in press). Your students as scientists: Guidelines for teaching science through disciplinary inquiry. In: Yager, R. (ed.). *Exemplary Science Program Monograph Series*. Arlington, VA: National Science Teachers Association.

Journal Articles:

Baumgartner, E. (in press). Thinking outside the kit: Building pre-service science teacher's inquiry skills with an experiment that doesn't go as planned. *The Journal of College Science Teaching.*

Baumgartner, E., & Duncan, K.D., & Young, D.B. (2009). The role of the University of Hawaii Laboratory School in an NSF GK-12 training grant. *The National Association of Laboratory Schools Journal*, 31(2): 1-6.

Winningham, R.G., Templeton, J.H., **Dutton, B.E.**, and Scheck, S.H. (2009). A Grassroots, Faculty-Driven Initiative to Institutionalize Undergraduate Research: The Ins and Outs of Cultivating Administrative Support. *CUR Quarterly*, 30(1): 29-34.

Bledsoe, K. and Kellar, H. (2009). The OSTA Science Partnerships Grant: Lessons learned from the first year. *The Oregon Science Teacher*, 51(2), 6-12.

Presentations:

Baumgartner, E. (2010). The Nature of Science in an undergraduate biology survey course. Presented at the 69th Meeting of the Oregon Academy of Science. Portland, OR.

Baumgartner, E., Phillips, L., and Kumabe-Maynard, E. (2009). Picturing Science: Scientific Literacy meets Visual and Language Literacy. Invited workshop presentation to National Marine Educations Association. Pacific Grove, CA.

Boomer, S.M. and **Latham, K.L.** (2010). Manipulatives-based laboratory for majors biology – a hands-on approach to understanding respiration and photosynthesis. Presented at ASM-CUE. San Diego, CA.

S. M. Boomer, S.M. (2010). Assessment Strategies and Improved Learning in Non-Majors Microbiology – A Moving Target Given Soaring Pre-Nursing Demands? Presented at ASM-CUE. San Diego, CA.

Klatt, G.D., Wood, J.M., **Boomer S.M.**, Brown I.I., Bryant, D.A., Garcia-Costas, A.M., Hergaard, M., Jay, Z., Parenteau, M.N., Manning, T.*, Miller, S.R., Rusch, D.B., Tringe, S.G., Ward, D.M., and Inskeep, W.P. (2010). Exploration of the structures and biogeographical patterns of phototrophic bacterial communities inhabiting diverse geothermal habitats in Yellowstone National Park using metagenomics. Presented at the Ecological Society of America Annual Meeting. Pittsburgh, PA.

Klatt, G.D., Wood, J.M., **Boomer S.M.**, Brown I.I., Bryant, D.A., Garcia-Costas, A.M., Hergaard, M., Jay, Z., Parenteau, M.N., Manning, T.*, Miller, S.R., Rusch, D.B., Tringe, S.G., Ward, D.M., and Inskeep, W.P. (2010). Metagenomic explorations of community structure among phototrophic microorganisms inhabiting diverse thermal habitats in Yellowstone National Park. Presented at the International Society for Microbial Ecology Annual Meeting. Seattle, WA.

Parenteau, M.N., Jahnke, L.L., Green, S.J., **Boomer, S.M.**, and Pierson, B.K. (2010). Marine *Chloroflexus*-like Organisms Synthesize Mid-Chain Branched Monomethylalkanes. Presented at the Astrobiology Science Conference. League City, TX.

Dutton, E.K., Taylor, S.B., Aldrich, P., and **Dutton, B.E**. (2010). Application of Spatial Statistics to Latent Print Identifications: Towards Improved Forensic Science Methodologies. Presented at the 62nd Annual Meeting of the American Academy of Forensic Sciences. Seattle, WA.

Taylor, S.B., Stanley, R., MacNab, I., and **Dutton, B.E**. (2009). Historic Land-Cover Analysis of the Luckiamute River Basin, Central Oregon Coast Range: Preliminary Results from the Earth Science Program for Undergraduate Research at Western Oregon University. Presented at the Geological Society of America Fall 2009 Meeting. Portland, OR.

Haberman, K.L. (2009). Use of macroinvertebrates to assess low-level anthropogenic impacts on the Little Luckiamute River, western Oregon, USA. Presented at the 94th Annual Meeting of the Ecological Society of America. Albuquerque, NM.

Milton E.F., **Howard, A.R.**, van Iersel, M., Barb, J.A., and Donovan, L.A. **(**2010).Characterization of putative drought tolerance traits in wild *Helianthus argophyllus* and commercially grown *H. annuus.* Presented at Evolution annual meeting. Portland, OR.

LeMaster, M.P., Stephani, A.*, and R.T. Mason. 2010. Bigger is Better: Size-dependent Mate Selection and Pheromone Production in Garter Snakes. Presented at the Society for Integrative and Comparative Biology (SICB). Seattle, WA.

Bledsoe, K. and Kellar, H. (2010). *OSTP:* A Blended Model of Professional Development. Presented at the Department of Education Mathematics and Science Partnership Program Regional Meeting. New Orleans, LA.

Bledsoe, K., Kellar, H., and Gummer, E. (2010). Developing a Hybrid Model of Professional Development. Presented at the National Science Teachers Association annual meeting, Philadelphia, PA.

C. Service

1. Mathematics

- Scott Beaver: Vice-President, WOU Faculty Senate, Treasurer, WOUFT (AFT-OR Local 2278), WOUFT Collective Bargaining Team Chair-Elect, Awarded Treasurer of the Year for AFT-Oregon, 2009-2010.

- Laurie Burton: Curriculum Committee Chair, 2009 – 2010 (Included move from paper to online process for WOU faculty).

- Klay Kruczek: President, Oregon Mathematics Education Council, November 2008 – Present, Communications Officer, Pacific Northwest NExT Section, April 2007 – Present, Proctor, Judge, and Problem creator for the Oregon Invitational Mathematics Tournament, Portland State University, May 2010. (The OIMT is the annual statewide high school math competition.), Chair-elect, Pacific Northwest Section of the Mathematical Association of America.

- Cheryl Beaver and Laurie Burton, with the support of Mary Beisiegel, Scott Beaver, Klay Kruczek, and Mike Ward, organized the Sixth 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, Laurie Burton, and Klay Kruczek, Co-organized session "Active and Innovative Learning Approaches for Pre-service Mathematics Teachers at the K-12 and University Levels," MathFest, Portland, OR, August 2009

2. Earth and Physical Science

- Jeff Myers: Senate Honors Committee, Ad Hoc Experience task Force, Division Curriculum Committee, Preview day advisor, SEP faculty discussion panel, Co-chair of Oregon Academy of

Science Geology Section with Scott Burns (PSU), Consulting activities with Paleoenvironmental Consultants, Altadena, CA, and Paleoresource Consultants, Sacramento, CA.

- Steve Taylor: Division Chair of Natural Sciences and Mathematics, Oregon Geographic Information Council, chair of the Oregon State Board of Geologist Examiners (OSBGE), council of examiners Association of State Boards of Geology, State Geologic Map Advisory Committee, Oregon Dept. of Geology and Mineral Industries, Portland, Oregon.
- Jeff Templeton: Chair of the Earth and Physical Science Department, EPS Dept. scheduler and budget manager, NSM Division Building Committee, NSM Division Budget Committee, Preview Day and SOAR advisor, Executive Committee for Program on Undergraduate Research (CUR), Academic Showcase Planning Committee.
- Phil Wade: Science teaching outreach at Sheridan K-8 NASA School (~100 hours of service) (part of WOU GiFT NASA Grant Team), Oregon Department of Education Science Content Panel Member, Education Board Member: A. C. Gilbert Discovery Village Science Museum, Session chair for 2010 Academic Excellence Showcase.

3. Chemistry

- Arlene Courtney: University Freshman Year Experience Committee, University LACC review Committee, University Faculty Development Committee, Chaired Department of Chemistry (Winter and Spring due to Fall sabbatical).
- Patricia Flatt: University Student Conduct Committee, NSM Seminar Committee, NSM Technology Committee.
- Rahim Kazerouni: University Grievance Committee, University PRC, NSM Curriculum Committee, Acting Department Chair Fall 2009
- Pete Poston: University Faculty Senate, Chair Chemistry Adjunct Search Committee

4. Biology

- Dr. Erin Baumgartner served as a member of the National Marine Educators Association Ocean Literacy Committee and the National Science Teachers Association *NSTA Reports* advisory board. In addition, she was a consultant on the Teacher Profession Development for Ocean Literacy project through the University of Hawaii-Manoa. Lastly, she was also a consultant for the Teacher Professional Development for Ocean Literacy project.
- Dr. Sarah Boomer was involved in reviewing three manuscripts from different journals in the field of microbiology and was also involved in the ad hoc review of two federal grants for the National Science Foundation.
- Dr. Bryan Dutton was a co-advisor for the Natural Science Club, served as the coordinator for the Peer-led Team Learning program for the Biology Department, and served as coordinator for the Program for Undergraduate Research Experiences (PURE). In addition to his service to the WOU community, Dr. Dutton was assistant editor of the Vasculum, the Society of Herbarium Curators' official newsletter.
- Dr. Karen Haberman was involved in two working groups, "undergraduate research" and "aquatic biology", through the Ecological Society of America.
- Dr. Kristin Latham trained with the WOU Safety Zone to provide students with resources, referrals, and assistance regarding gay, lesbian, bisexual, trans, and queer concerns. In addition, she was a guest speaker at the Hillside Retirement Community and the Yamhill County Career Fair.

- Dr. Mike LeMaster was a co-advisor for the Natural Science Club, assisted in cadaver tours for high school students, and served as a guest presenter for the WOU Pre-nursing program to high-school students visiting the OHSU nursing program.
- Dr. Karen Bledsoe was a section chair for the Oregon Academy of Sciences annual meeting and also was involved in reviewing two manuscripts for science education journals.

III. STUDENT ACHIEVEMENTS

A. Mathematics

- **Major Field Test**: In 2009 and 2010, the mathematics majors scored in the 90% percentile on the Mathematics Major Field Test, put out by ETS.
- At MathFest 2009, Masaki Ikeda (BS 2009) won an award funded by the **American Mathematical Society** for excellence in student exposition and research.
- At the Second Annual Northwest Undergraduate Mathematics Symposium, held at Oregon State in April 2010, L**aura Waight** (BS Math 2010) won the Best Short Talk Award, **Nick Gard** (BS Math 2010) won the Pi Mu Epsilon Award, and **Mitch Staehle** (BS Math 2010) won the SIAM Award.
- **Kady Hossner**, mathematics major, attended the 2010 Nebraska Conference for Undergraduate Women in Mathematics.
- **Matt Schmidgall,** BS Math 2010, has been accepted to the2010 Bridge Program for Entering Graduate Students at Texas A&M University.
- Two mathematics majors, **Jason Bathke and Heather Johnston**, have been accepted to the 2010 Pre-REU on Signal and Image Analysis at the Texas A&M University.
- Six students who graduated with a degree in mathematics in 2010 (Emily Trigg, Anne Sanders, Danny Corliss, Laura Waight, and Nick Gard) have been accepted into the WOU MAT program.

B. Earth and Physical Science

- Earth Science Alumna Rachel Perot completed her M.S. degree in engineering geology at Portland State University with a thesis entitled “2006 Debris Flow Occurrence on Mt. Hood”. Rachel is now working for an engineering company in Lake Oswego.
- 25 Earth Science students participated in the 2010 WOU Academic Showcase, authoring both scientific posters and oral presentations.
- Ryan Stanley and Brandon Snook both applied for NASA Oregon Space Grant Scholarships to conduct watershed research in western Oregon.
- Kelsii Dana received a $45,000, two-year undergraduate research fellowship to study nitrates and groundwater quality in the mid-Willamette Valley.
- Alumna Heather Hintz is working as a seasonal park ranger at Oregon Caves National Monument.
- Thomas VanNice, a 2010 graduate, has obtained employment with Oregon Dept. of Fish and Wildlife working in watershed restoration.
- Alumna Jamie Fisher was recently hired by Resolution Copper Mining in Arizona to work at a project geologist.
- Matt Buche, 2009 graduate obtained employment as a field geologist for Kane Geotechnical in Fresno, CA.

- June 2010 Student Recognition Awards: Kelsii Dana and Brandon Snook, Outstanding Junior Undergraduate in Earth Science; Ryan Stanley, Outstanding Graduating Senior in Earth Science.

C. Chemistry

- Jennifer Blaser accepted into Colorado State University Chemistry PhD program
- Shawn Decker recipient of NASA Scholarship
- Chemistry Student Seminars:
  - Jennifer East - Human Decomposition Chemistry
  - Kevin Swearingen - Glassifying Radioactive Waste for Long Term Storage
  - Shawn Decker – Modeling of Atoms With Hartree-Fock Theory
  - Jeff Sigrist – Characterization of Biosynthetic Pathways from *Frankia alni*
- Honors Student Video Documentary Titles:
  - Alyssa Schmidt and Diedra Cates – Biodiesel: The Fuel of the Future?
  - Jennifer Dicus and Joceline Wynn – A New Look At Hydroelectric Energy
  - Sierra Durfee and Maria Hommes – The Coast of Sustainability: Investigation of an Off-the-Grid Living Situation
  - Marina Jaschek and Melissa Wiener – Clean Coal: An Impossible Goal?

D. Biology

<u>Acceptances to Graduate Programs</u>:

- Travis Hoagland — Oregon State University Pharmacy Program (Pharm.D.)

<u>Acceptances to Undergraduate Programs</u>:

- Trudy Hogg, Marley Winkleman — Oregon Institute of Technology Dental Hygiene Program
- Carolyn Anderson, Marie Bartlett, Carie Cyphers, Jamie Abell, Brian Messman, Danny Sundquist, Tiffany Guyette, Tara Warren, Kim Flora, Gianluca Costigliola — OHSU School of Nursing
- Whitney Langwell, Katherine Ramos, Marcus Pearson — University of Portland School of Nursing
- Melinda Sanchez, Jemima Hagen, Megan Stocks, Cinda Schimanski, Eva Vaquera-Contreras — Linfield College School of Nursing
- Jordann Gilmer — Pacific Lutheran University School of Nursing
- Lauren Zegers — John Hopkins University School of Nursing
- Kayla Teague — Walla Walla Community College
- Robert Richardson — OCNE – Umpqua Communit College

Special Recognition:

- Derek Palmer — Outstanding Achievement in Biology and Pre-professional Studies – NSM Awards Night
- Mike Petrovich — Outstanding Achievement in Biology and Pre-professional Studies – NSM Awards Night
- Adrienne Godshalx — Outstanding Achievement in Biology and Pre-professional Studies – NSM Awards Night
- Jenae Perman — Outstanding Achievement in Principles of Biology – NSM Awards Night
- Justin Karr — Outstanding Achievement in Principles of Biology – NSM Awards Night