**DIVISION OF NATURAL SCIENCES AND MATHEMATICS**
**2008-2009 ANNUAL REPORT**

*Revised Aug. 24, 2009*

# I. EXECUTIVE SUMMARY

## a. Division Highlights

The 2007-2008 academic year was associated with continued growth and infrastructure development in the Division of Natural Sciences and Mathematics (NSM). The launch of the OHSU-Monmouth nursing program at the WOU campus provided a catalyst for continued enrollment growth in 100- and 200-level biology and chemistry courses. Campus-wide opportunity funds and stimulus monies resulted in much needed equipment purchases and building renovation projects. Significant events of note in the Division include continued pre-nursing enrollment growth (Biology, CH100), increasing demand for remedial mathematics courses, hiring of tenure-line replacement faculty in Biology and Mathematics, hiring an additional laboratory preparator split between Biology and Earth Science, completion of the anatomy and physiology laboratory, renovation of rooms NS017 and NS101 (in progress), settling of faculty into the Math-Nursing Building, and ancillary equipment purchases. 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.

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 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 Biology program is notably robust with a strong number of majors and graduates, nationally recognized faculty, a consistent record of student placement, and continued enrollment growth at all levels.

- 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 parallel enrollment growth in health science-related service courses.

- 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 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 as one of the top 10 programs in the area of teacher education. A recent study by the National Council on Teacher Quality (Greenberg and Walsh, 2008) determined that the WOU math education program is highly robust and making significant contributions in the area of teacher preparation. This recognition combined with strong enrollment numbers in the math education courses attest to the success and dedicated work of the faculty.

**b. Biology Department**

- Our enrollment numbers were the highest they have been in the past decade (~ 2300 students taking biology-related coursework). The observed increase from previous years extends to coursework at both the majors and non-majors levels (see Figure 1).

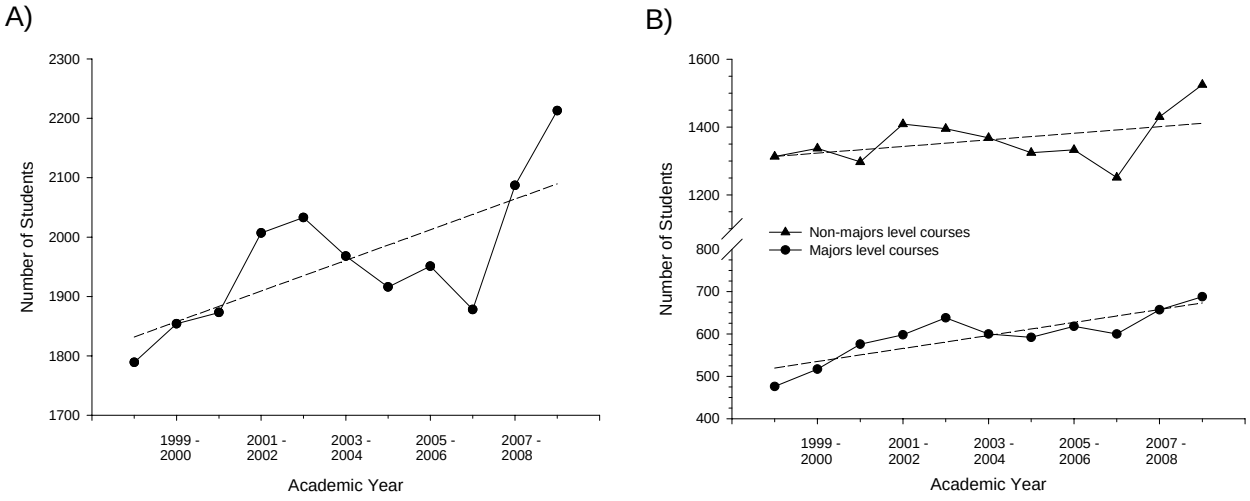


**Figure 1**. The annual number of students enrolled in biology courses since the 1998 – 1999 academic year (A). The observed increase is due to enrollment increases in both majors and non-majors level coursework (B – majors and non-majors courses plotted separately). The dotted lines represent trend lines based on regression analysis of the data.

- Our students have been successful in their pursuit of biology-related careers. For example, several were accepted into professional schools and advanced degree programs. At least two graduates were admitted into medically-related, graduate level professional schools (i.e. medical school, dental school, physician's assistant and pharmacy programs.) In addition, at least five students were accepted to a graduate program in biology (one who received a Phi Kappa Phi Scholarship to attend graduate school), and several other students have contacted us about their success in obtaining biology-related jobs, internships and fellowships. Furthermore, twenty one students were accepted into professional undergraduate programs (e.g., nursing school, dental

hygiene school) both in the state and across the country. Please see the Appendix 1 at the end of this document for a complete listing of the students accepted into the various programs.

- The Biology Department made significant strides this past year with respect to space and technology issues for our laboratories. Monies made available through the university allowed for the remodel of our Human Anatomy and Physiology laboratory with the addition of a room dedicated to cadaver storage and dissection. In addition, two laboratories (NS 006 and NS 123) were converted to smart rooms with each room also receiving new computers for student use (NS 006 = 12 computers; NS 123 = 6 computers). Discussions were also initiated concerning the remodels of the NS 004 laboratory and the laboratory prep spaces and the development of an annex for large equipment to free up space in the laboratories, prep rooms, and research spaces.

- Collectively, our department members published five papers in peer-reviewed journals, with two other papers currently in the review process. We also gave six refereed papers at state and national meetings and workshops. Three of these papers and presentations were co-authored by current and / or former WOU students who contributed significantly to them.

- Our faculty members continue to receive grant monies for their research. This past year, monies have been received from the Department of Energy (1 grant; ~ $100,000), WOU Faculty Development Awards (4 grants; ~ $4200), and the Division of Natural Sciences and Mathematics (3 grants; ~ $1700). In addition, members of the department are primary authors on two grants, one submitted to the National Science Foundation and the other to the Oregon SeaGrant which are currently under review and total ~$275,000.

- Our faculty members contributed significantly to the governance of WOU. Biology faculty was represented on four university-wide committees, faculty senate, institutional review board, and the Academic Excellence Showcase planning committee. In addition, our departmental members also served on four search committees for both new faculty (2 positions) and staff (2 positions).

- Our faculty members continued to provide individualized advising geared towards each student's interest and career goals. One of our members received the WOU Faculty Academic Advisor of the Year award. 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.

- Our 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.

- Our department conducted a successful search that resulted in the hiring of a new tenure-track faculty member – Dr. Ava Howard is our new plant physiologist. Her presence in the department will allow us to maintain our breadth in core courses as well as upper-division specialties in the field of botany. Also, her research systems are quite amenable to undergraduate research opportunities. In addition, we were part of a successful search with Earth Science for a new lab preparator, Julie Grammer, who splits her time equally between Biology and Earth Sciences.

**c. Chemistry Department**

- The Chemistry program graduated six students at the end of the 2008-2009 academic year. In contrast to past years where more students followed the forensic option, four of the graduating students completed the requirements for the traditional option and two the forensic option. This

did not indicate a decline in the popularity of the forensic chemistry program, but rather, showed student interest in merging the two options through combining a traditional major with a forensic minor. There seems to be increasing interest among our students in the traditional major.

- The Chemistry Department had notable growth in the Ch 104-106 sequence for 2008-2009 which necessitated the addition of lecture seats and two laboratory sections. The increase in enrollment was a consequence of the new nursing program. We expect to see continued growth in this area for the near future. To accommodate pre-nursing students, we are investigating the addition of a third section of this course to run as a trailing section (Ch 104 beginning in winter term). This section could accommodate up to 48 students with the addition of two laboratory sections (total .5 FTE).

- In anticipation of the increased pressure that would be placed on department resources with the influx of pre-nursing students, a new tenure track position was added for Fall 2008. Dr. Patricia Flatt, whose specialty lies in the area of biochemistry, was hired. Dr. Flatt proved a valuable addition to the department. She covered some of the new laboratory load of the Ch 104-106 sequence, as well as taking on assignments in the forensic area and the sole responsibility for biochemistry which had been previously covered by Drs. Guralnick and Galvan of the Biology Department. We were able to offer a biochemistry laboratory for the first time. The original plan had been for that laboratory, which had been in the catalog for a number of years but never offered, to be a joint venture between the biology and chemistry programs taught by Drs. Flatt and Guralnick. However, Dr. Guralnick's departure from the university left the instruction for this course totally to chemistry. Unfortunately, the enrollment proved to be low for the course, and we believe this was due to a class time conflict with Biology's Immunology. We will determine the viability of this course by offering it again during Winter 2010.

- Chemistry Department members have contributed to the University as active participants in many areas including the LACC Review Committee, the Freshman Experience Committee, the Faculty Development Committee, Faculty Senate and Student Conduct Committee

- Chemistry faculty have contributed to all areas of the Division including service on a number of committees including Building Utilization and Planning Committee, Technology Committee, Professional Concerns Committee, Curriculum Committee, Budget Committee, Personnel Review Committee; NSM seminar planning , and class scheduling action group.

- The Department has been active in recruitment through organizing activities such the Oregon Junior Academy of Science and JSHS programs and high school career day visitations.

- Two chemistry faculty members received Faculty Development Funding for major research grants while one faculty member received a National Park research internship and participated in the filming of a National Geographic documentary.

**d. Earth and Physical Sciences Department**

The Earth and Physical Sciences Department consists of two program areas – Earth Science and Physics. The following is a summary of 2008-2009 departmental highlights:

- Earth and Physical Science faculty members actively served as leaders on a number of campus-wide initiatives including the Academic Excellence Showcase planning committee and the Program for Undergraduate Research Experiences (Templeton), NSM Division Chair in the College of LAS (Taylor), 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: president of the Oregon Academy of Science (Myers), participation in NASA Oregon Space Grant Program (Schoenfeld), participation and leadership in state-level geoscience advisory boards (Taylor), and collective faculty membership and participation in professional societies (American Association of Physics Teachers, American Geophysical Union, Association of American Geographers, Botanical Society of America, 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. Collective scholarly activities this year resulted in 3 professional presentations, 3 published abstracts, 4 grant proposals, and 3 peer-reviewed manuscripts (Refer to Appendix 1)

- 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 over 8500 student credits hours (SCH) during the 2008-2009 academic year, accounting for 30% of the total production in the Division of Natural Sciences and Mathematics.

- In close collaboration with WOU administration, the Earth Science program completed updates to the curriculum including expanding options for the mathematics requirement, addition of new upper division elective courses, and general housekeeping related to major/minor requirements.

- Earth and Physical Science programs are experiencing modest growth, in parallel with overall university trends. ES100 LACC enrollments and retention are very strong. The program is actively advancing forward with respect to opportunity funding and infrastructure development in NS017 and NS101. The number of Earth Science degrees awarded in June 2009 were comparable to those in Mathematics and Chemistry.

- Earth Science faculty and students were well represented at the 2009 WOU Academic Showcase, with a total of 4 faculty session organizers and 54 student presentations on topics including regional geology of the Pacific Northwest, Oregon seismic hazards, the Cascadia subduction zone, alternative energy, and applications of Geographic Information Systems to watershed restoration.

**e. Mathematics Department**

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

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

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

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

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

## II. ENROLLMENT TRENDS

### a. Biology Department

As noted above, there has been continued growth in student enrollment in biology-related courses over the past decade. Currently, the Biology Department staff 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). However, this total does not represent the true hours available as Department Head release time (9 hours / academic year), faculty release time for university committee service (e.g., Faculty senate president, PURE; hours vary depending on assignment), release time for new faculty (3 hours / year), or release time provided via monies from research / teaching grants (hours vary based on grant) are not included in this calculation. The current 2009 – 2010 academic schedule of courses requires 413.25 hours of the available 423 hours be devoted to the classroom to meet student demand, with approximately 53% of the hours dedicated to non-major level coursework and 47% dedicated to major level coursework.

While the growth in student enrollment is widespread across the biology curriculum, two areas have shown significant increases. First, enrollment in our majors level introductory series (Biology 211 – 213) has shown a rapid rise in the last five years, with the number of students enrolled in the sequence increasing from just over 200 students during the 2004 – 2005 academic year to approximately 350 students during the 2008 – 2009 academic year (Figure 2). Currently, we are no longer able to find available FTE and space for individuals actively seeking the introductory sequence, having already opened several new laboratories and lecture sections over the past several years.

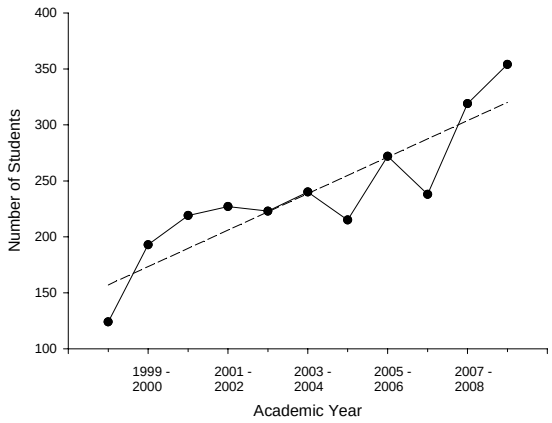


**Figure 2**. The annual number of students enrolled in the introductory biology for majors series (BI 211 – 213) since the 1998 – 1999 academic year. The dotted line represents the trend line based on regression analysis of the data.

Second, given that 300 – level core courses are currently only designed to serve 24 – 48 students / year (again based on both FTE and space constraints), the implications for observed entry level growth of this magnitude is significant. Indeed, in the Spring of 2009, we found it necessary to increase the enrollment for our Introductory Genetics course (BI 311) and our Advanced Human Anatomy and Physiology course (BI 334) for the Fall of 2009 to meet these demands. We fear that this may simply represent the 'tip of the iceberg' regarding future enrollment numbers for upper division courses.

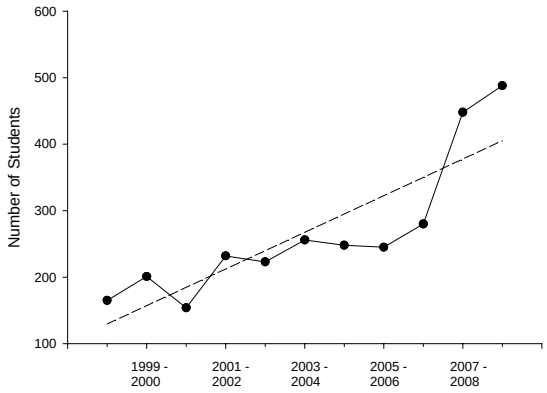


**Figure 3**. The annual number of students enrolled in the Human Anatomy and Physiology series (BI 234 – 236) since the 1998 – 1999 academic year. The dotted line represents the trend line based on regression analysis of the data.

Third, enrollment in our non-major health professional service courses, primarily Human Anatomy and Physiology (BI 234 – 236) and Microbiology for Health Sciences (BI 318), have shown a rapid increase in the last three years (e.g., Figure 3), coinciding with the development of the OHSU Nursing Program – Monmouth Campus. Despite efforts to keep lecture sections for these courses at or under 72 students per section (including developing multiple sections (e.g., BI 318) and / or trailer sequences (e.g., BI 234 – 236)), most of these classes have reached capacity. The Human Anatomy and Physiology series has grown in a particularly dramatic manner, with multiple faculty now teaching multiple sections during multiple terms. This growth has been so rapid there are limited times available for the development of common standards among the faculty, a necessity if this series is to successfully incorporate new curricular practices in this field.

To address these enrollment increases, the Biology Department must grow in terms of faculty that can serve both majors and non-majors course demands. In terms of majors level enrollment needs, we are looking at the feasibility of developing a Biology 211 – 213 trailer sequence (similar to that already available for Chemistry's introductory series, 221 – 223). This would not only serve an additional 48 majors per year, but it would better address retention issues regarding incoming freshman who are not as prepared for the rigors of the 200 sequence (i.e., these students could begin the non-majors / 100-level biology and chemistry in the fall, transitioning into the majors level series in the winter). Developing a 200-level trailer sequence would add 24 FTE (1 lecture and 2 laboratory sections, serving 48 students / term).

To accommodate these growth issues, the Biology Department sees the need for two additional tenure-track faculty lines, one with a cell / molecular emphasis and one with an organismal emphasis. In addition to serving the 200-level series, these faculty – given these areas of expertise – will also be able to address growth needs in the 300-level core requirements (e.g., genetics, cell biology, and field biology) and related emphases (e.g., animal physiology, animal diversity). The addition of these faculty lines would also address the non-majors health professional enrollment needs, as either a current faculty member or a new hire could devote time to coordinating the Human Anatomy and Physiology program to provide, deliver, and assess a consistent curriculum and ensure long-term program stability at both the majors and non-majors levels.

Space limitations are another obstacle facing the Department of Biology. In terms of lecture facilities in the Natural Sciences Building, scheduling classrooms – especially for classes that exceed 50 students - is challenging and will continue to be problematic as student numbers increase in our program. Core courses like Genetics, Evolution, and Cell Biology are currently at or just beyond 50 students, the maximum number of seats in the medium-sized lecture rooms in the building; at this time, it is not

possible to schedule core courses in the largest lecture rooms because of other courses (including 100- and 200-level biology, and Human Anatomy and Physiology) requiring the use of these rooms. Although the Division is looking at synchronizing schedules to remedy some of these issues, the Biology Department anticipates that new building projects on campus (e.g., the Wellness Center) will alleviate pressure on these spaces.

In terms of laboratory space for teaching, most rooms are sufficient but their poor design makes them very inefficient in terms of serving students, housing equipment, and preparing labs. For example, most classroom laboratories were originally designed by a former chemistry faculty member, resulting in unnecessary sinks in the center of each lab bench, and holes in all the laboratory tables (for the assembly of metal frameworks to hold chemistry equipment) – both of which reduce bench space that could be used for additional set-up materials and equipment. Although efforts to create smart lab classrooms have positively resulted in the installation of computers at most benches in teaching labs, the poor design of bench space makes it difficult to incorporate computer-based programming efficiently into the laboratories. Finally, even though many large, modern pieces of equipment have been recently acquired for teaching (e.g., cell biology tissue culture hood, specialty incubators, fluorescence microscope), current lab layouts cannot accommodate these items because of space and / or infrastructure issues. Adjoining lab preparation and storage rooms are likewise poorly designed, filled to capacity with equipment, and – most problematically – contain equipment (e.g., dishwashers and stoves) that are not working and / or out-dated. Major remodels of the laboratories would alleviate many of these issues and would lead to more efficient use of laboratory space.

In terms of faculty office space (including, in some cases, back room research space), the Natural Science Building is filled to capacity, which obviously poses a major challenge to housing new faculty. Indeed, one recently-hired tenure-track Biology Faculty member currently lacks an office with back room research space. Given that it is unlikely a new science building (the most logical long-term solution) will be built in the near future, office and research space problems need to be addressed through existing building renovations to create office space. Specifically, cleaning up and redesigning storage and lab preparation rooms could add new office space for existing lab preparators, thus freeing up offices for faculty. Additionally, such renovations would allow for better equipment management and storage, including the development of shared research spaces that would provide a better alternative to back room research space.

### b. Chemistry Department

The Chemistry program graduated six students at the end of the 2008-2009 academic year. In contrast to past years where more students followed the forensic option, four of the graduating students completed the requirements for the traditional option and two the forensic option. This did not indicate a decline in the popularity of the forensic chemistry program, but rather, showed student interest in merging the two options through combining a traditional major with a forensic minor. There seems to be increasing interest among our students in the traditional major.

The Chemistry Department had notable growth in the Ch 104-106 sequence for 2008-2009 which necessitated the addition of lecture seats and two laboratory sections. The increase in enrollment was a consequence of the new nursing program. We expect to see continued growth in this area for the near future. To accommodate pre-nursing students, we are investigating the addition of a third section of this course to run as a trailing section (Ch 104 beginning in winter term). This section could accommodate up to 48 students with the addition of two laboratory sections (total .5 FTE).

### c. Earth and Physical Sciences Department

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 is 40, 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).

Based on enrollment data from 2004-2009, the Earth Science program supports an average of 25 majors and 15 minors, with a range of 4 to 8 baccalaureate degrees per year. 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 (Dr. 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. Approximately 3% of the declared majors advance on to graduate school in either education or geoscience. Over 20% of the same group obtained employment as K-12 teachers, and approximately 12% found at least temporary employment in the fields of geospatial technology or natural resources management (GIS, forestry, geotechnical, watershed management).

Earth Science enrollments have been increasing over the past 3 academic years (2006-2009). Total student credit hour production increased 15%, ES100 enrollments 11%, and ES200 enrollments rebounding by 96%. The upper division population is steady, with a consistent range of 7 to 15 students per course.

### d. Mathematics Department

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

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

There has been a significant increase over the years of students in the general service courses. Because of this and the desire for students to take mathematics their freshman or sophomore year, the number of sections of MTH 70, MTH 95, and MTH 111 has increased greatly in the past couple of years. It seems that, finally, the correct number of sections of each course is being offered each quarter. As a result of changes in degree requirements for students in the natural sciences, the enrollment in the calculus sequence has increased as well. This has not quite been handled completely yet. With the reallocation of resources due to the reduction of upper division mathematics electives offered, the department plans to offer two sections of MTH 251 in the fall of 2010. We also do not know what the effect of the nursing

program will be on the enrollment in MTH 243. So far, there has not been an impact, but Jean Donovan, assistant professor of nursing for OHSU, would like to offer another section of MTH 243 in the fall designed for the nursing students. The Mathematics Department and the nursing program are working out the details of this. Again, offering less upper division mathematics electives will allow the department to cover this extra section.

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

## III. PROGRAM ASSESSMENT

### a. Biology Department

The Biology Department continued its long-term program review and assessment activities. Detailed reports of the various activities have been included elsewhere (e.g., assessment logs, etc.) and include:

- A departmental retreat attended by all tenure-track faculty at the start of the 2008-2009 academic year to discuss assessment strategies and program review strategies.

- Members of the department attending multiple division- and college-level discussions of assessment activities at Western Oregon University.

- A year-end assessment of the Biology Department's Learning Outcome 2: Engagement in laboratory experimentation, data analysis and interpretation, and critical thinking at all course levels. This is the second year that this data has been collected for courses across the entire department.

- The design and implementation of pre-/post-assessment activities for multiple upper and lower division courses by a majority of the faculty.

- The initiation of a major program assessment of the BI 100 course series. This included the development and pilot testing of science attitude surveys, laboratory evaluation forms, and questionnaires and assessment protocols to gather information on BI 100-level instructors about strategies and learning outcomes to assist in instructional alignment.

- The development and implementation of an exit survey for Biology majors focused on their attitudes, activities, and career goals during their tenure in the Biology Department at WOU.

- The continued administration of the Educational Testing Service's Major Field Test in Biology to all graduating majors from the Biology Department.

### b. Chemistry Department

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

*Formative Assessment*

Formative assessment of Chemistry students is accomplished within the course offerings using a number of traditional methods including quizzes and exams taking the form of essays, multiple choice, true/false, and problem solving; group oral presentations and writing assignments. The program has a significant writing component through which students demonstrate mastery of concepts in both traditional and non-traditional ways. Traditional writing assignments include the laboratory notebook and formal laboratory reports. Less traditional forms include abstracts, annotated bibliographies, letters, reports in business and forensic styles, press releases, research proposals, project summaries, and web pages. Critical thinking skills are tested at different stages of the program by having students solve laboratory unknowns and develop research questions. The results of these investigations are presented in a number of ways including formal reports, poster presentations, powerpoint presentations, and webpage authoring. The style and level of formative assessment varies with instructor and course content. In some courses, American Chemical Society standardized examinations are administered at the conclusion of a course to assess student knowledge relative to a national scale.

Embedded assessment action logs have been completed for a variety of the courses offered during the 2008-2009 academic year. The Ch 334-336 sequence (organic chemistry) is assessed through administration of the ACS standardized organic chemistry examination, and the results compared to national norms. Within the OUS system, student performances of the national 50th percentile or better are considered to show successful mastery of organic chemistry at the upper division level. Of the twenty students who took the exam, 14 (70%) scored above the 50th percentile and nine of those scored above the 65th percentile.

*Summative Assessment*

Summative assessment is accomplished in a number of ways. Chemistry majors complete two capstone courses. CH 461, 462 is a two term, inquiry-based capstone laboratory course. As a major component of this course, students design and carry out a group research project which requires integration of concepts from all the core areas of chemistry. Throughout this course, students demonstrate their level of proficiency in chemistry and their ability to use theoretical knowledge in practical applications. The second capstone course is Seminar (CH 407). In this course each student chooses a chemical topic of current interest, conducts an in-depth literature search on that topic and presents a formal public seminar on the topic. The body of the seminar must be between 30 and 40 minutes in length. These seminars are evaluated by a panel of judges who assess the student's ability to present the topic in a clear logical manner, the depth of the student's understanding of the topic, the quality of student's written work (slides, abstract and annotated bibliography), and the student's ability to answer questions. These student seminars were presented during the university-wide, Academic Excellence Showcase event sponsored jointly by the Phi Kappa Phi honor society and the Program for Undergraduate Research Experience. The evaluation of the students completing their seminar requirement in Sprint 2009 indicated performance well above the average from previous years.

All students must complete both of these capstone course offerings to graduate from the Chemistry program. In addition to these course requirements, all students in the forensic chemistry option must complete an internship in an external laboratory. In conjunction with assessment via capstone courses, the Educational Testing Services (ETS) major field test for chemistry was administered.

*ETS Field Test for Chemistry Results*

The interpretation of the results of this assessment instrument must accommodate the differences inherent in our two different programmatic options (traditional and forensic.) Some coursework differences between the options are necessary to provide appropriate career preparation. While students in both

options complete the same core requirements of general chemistry, organic chemistry and analytical chemistry, students in the traditional chemistry option complete a three-term sequence in physical chemistry while students in the forensic option complete a one-term course in that discipline. Students in the forensic option are required to complete a two-term sequence in biochemistry. This sequence may be taken as an elective by students in the traditional option but is not a requirement. 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 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 would be expected to be higher for those students who have opted to take elective courses in that discipline.

The examination was administered during dead week of spring term to six students, one of who is within one term of graduation. The 2009 test edition was an updated form of the MFT so comparative data for this updated test will not be available until sometime in 2010. ETS reports that subscores cannot be compared to previous forms of the test as there are not sufficient equating questions to anchor the results. Since national norms for the individual subscores are not yet available, we cannot at this point in time make any assessments about the individual disciplines tested. However, initial evaluations can be made for the total test score which incorporates all subject areas of the exam.

The total score range on the exam is 120 to 200 points. The mean score for all WOU students was 151(standard deviation = 8.) This mean translates to the 50th percentile. The results in the area of biochemistry are reported as a separate assessment indicator, and WOU students answered 46% of the biochemistry questions correctly. We do not view this as a negative assessment since only four of the six students completed coursework in biochemistry. No comprehensive evaluation of the area specific subscores can be undertaken until new comparative norms for this test form are available from ETS. We hope to be able to use these test results to make some evaluation of the performance in core areas relative to our learning outcomes when they become available.

In 2009-2010, we will also be investigating a testing instrument recently developed by the American Chemical Society intended as an assessment tool for learning outcomes of undergraduate chemistry programs. This assessment instrument may better evaluate critical thinking skills than the ETS exam.

### c. Earth and Physical Sciences Department

This past year the Geology faculty completed changes to the Earth Science program curriculum, initiated in the previous year. These curriculum modifications 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. The changes will go into effect during the 2008-09 and 2009-10 academic years. The Earth Science program is in the process of implementing 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 will commence during the 2008-09 academic year with formative assessment strategies and continue until 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 Strategies. Initiated in Spring 2008, these measures 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 assessment strategies are being incrementally deployed in all Earth Science courses, including the new and modified courses that are part of this curriculum change packet.

Summative Assessment of Degree Program: The capstone course, Senior Seminar (ES 407), will continue 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 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.

Survey-Based Tracking of Current Students and Graduates: The Earth Science program is currently in the process of developing student and alumni tracking mechanisms, along with other programs in the College of Liberal Arts and Sciences. This is a work in progress with an implementation timeline spanning the next two years. Earth Science students and graduates will be tracked through several different mechanisms including the collection of numeric data and the utilization of Alumni Surveys. The types of numeric data that will be collected will include course enrollments, grade distributions, and time to degree completion. This data will be provided by the WOU Office of Institutional Research. Focus groups of current Earth Science students will be formed to determine the degree to which the proposed curriculum changes are accomplishing the intended outcomes. Senior Seminar (ES407) will serve as the gateway for conducting focus group surveys. We currently collect post-baccalaureate data via informal correspondence and networking between graduates and faculty (e.g., emails, phone calls, requests for recommendation). To more comprehensively gauge alumni satisfaction, formal surveys of Earth Science graduates will be conducted to help guide us in continually refining the degree program. Alumni surveying methodologies will be developed in collaboration with the College of LAS and the Office of Institutional Research.

During summer, 2008, Dr. Myers spent a great deal of time with colleagues at Cal State University, Monterey Bay, reviewing successful strategies for designing course materials with an eye toward embedded course assessments. CSUMB is an institution that is demographically similar, of similar size, and with a mission similar to that of WOU, and hence is an ideal model for designing assessment strategies, since CSUMB has invested considerable effort and resources into assessment. Myers is revising course content, organization, and syllabi with a view toward demonstrable and assessable

learning “blocks”. To date Myers has revised fall courses, and course syllabi were evaluated by the WOU teaching research assessment office and selected as models for effective syllabus design by Dean Scheck.

In Physics 211/212/213 this past year, Dr. Schoenfeld administered two national diagnostic exams; FMCE (Force-Motion Concept Evaluation), and ECCE (Electric Circuits Concept Evaluation). Students also participated in multiple mathematical modeling assessment activities using EXCEL spreadsheets.

**d. Mathematics Department**

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

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

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

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

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

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

## IV. PROGRAM INITIATIVES

The top NSM division action items for the 2008-2009 academic year included: (1) improved communication and team-building between individual faculty and departments, (2) development of budget survival strategies in response to the state economic downturn, (3) development of a building infrastructure committee to create strategies for space optimization, (4) formulation of sustainable enrollment management plans, and (5) institutionalization of advanced assessment methodologies for WOU science and mathematics programs.

### a. Biology Department

The Biology Department continued to invest significant time and energy into the administration of the Division of Natural Sciences and Mathematics over the last academic year. These activities include:

- Biology faculty serving on multiple division-wide committees, including the Building Utilization and Planning Committee, Technology Committee, Professional Concerns Committee, Curriculum Committee, Budget Committee, and Personnel Review Committee.

- Participation in discussions concerning the scheduling of coursework in an attempt to remove obstacles concerning student scheduling and space issues.

- Participation in discussions concerning budget issues and how best to insulate the division from the negative effects of proposed cuts.

- As noted above, participation in division-wide discussion of program reviews and assessment activities.

### b. Chemistry Department

No additional comments, see above.

### c. Earth and Physical Sciences Department

No additional comments, see above.

### d. Mathematics Department

No additional comments, see above.

## V. OTHER ACTION ITEMS

### a. NSM Division Items

The following is a summary of division-wide action items that will carry forward into the 2009-2010 academic year: (1) group planning meetings (NSM, registrar, admissions) are needed to improve coordination of SOAR summer advising, block scheduling, and math placement testing before the next round of student recruiting; (2) an improved methodology for SEP/DEP Cost Recovery is needed to reimburse NSM Division expenses associated with non-program related remedial math courses; (3) the NSM scheduling committee will reconvene in fall to continue work on improved schedule coordination, time/room conflict reduction, and space optimization; (4) the NSM building committee will continue planning/implementation work on reorganization of lab preparatory offices, development of a biology instrumentation room, remodeling/ creation of additional adjunct office space in the NS Building,

expansion of math classroom space; and (5) continued renovation of the NS Building, including finalization of NS017/NS101 upgrade (in progress), smartroom installation in NS115 Organic Chemistry Lab, remodeling and smartroom installation in NS004 Biology Lab, and desk/seating/floor replacement in the NS103 lecture hall.

**b. Biology Department**

No additional comments, see above.

**c. Chemistry Department**

No additional comments, see above.

**d. Earth and Physical Sciences Department**

The primary challenge facing the Department of Earth and Physical Sciences is the over-dependence on adjunct faculty and lack of tenure-line positions. The Earth Science program is currently in need of at least one tenure-track faculty position. The course load in the department is supported with an anomalously high number of adjunct instructors (adjunct/tenure line ratio ~ 60%) as compared to other departments in the Division of Natural Science and Mathematics (avg. ~ 30%). The Earth and Physical Science Department is exceedingly dependent on adjunct instructors and has had a long-standing need for additional tenure-line hires compared to other departments in the division. While we appreciate the dedicated service of our adjunct instructors, institutional stability, continuity, and future growth are dependent upon the stock of tenure-line faculty. 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. We are chronically hindered by a lack of tenure/tenure-track faculty horsepower to complete departmental service tasks and assessment activities that are increasingly required to sustain university accreditation.

To address this long-standing need, we have requested annually, since 2002, that the administration hire at least one tenure-track faculty member in the Department of Earth and Physical Science, most recently in the Earth Science Self-Study Report and in a call for positions in Fall 2008. We are seeking a Science Education Specialist with an enthusiastic interest in undergraduate physical science education for non-science majors and pre-Education majors. The successful candidate will teach courses heavily enrolled by K-12 pre-Education majors and LACC students, including all three courses in the introductory Earth System Science sequence (ES 104, ES 105, ES 106) and potentially the Earth and Physical Science Education Methods courses (GS 312 and GS 313). Additional instructional duties will depend on the background of the successful candidate, but may include Meteorology, Physics labs, Honors science, and one or more upper-division Science Education courses in area of expertise. A significant percentage of these courses have been staffed with 3 to 4+ adjunct FTE over the past 10 years. The consistent need and demand in this area is well documented, modest administrative investment in an additional tenure line is well justified.

In addition, an ongoing challenge is associated with the teaching load required of faculty. 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.

**e. Mathematics Department**

The main issue the Mathematics Department is running into is the lack of office and classroom space. The non-tenure-track faculty offices in MNB are very small, and two of the NTTFs in the department will

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

## APPENDIX 1. NSM FACULTY AND STUDENT ACCOMPLISHMENTS

### I. FACULTY AND STAFF ROSTER

The following is the WOU Natural Science and Mathematics faculty and staff roster for the 2008-2009 academic year.

Staff Members: Sharon Clinton (Chemistry Lab Preparator), Piper Mueller-Warrant (Biology Lab Preparator), Julie Grammer (Biology-Earth/Physical Science Lab Preparator), Sharyne Ryals (Math Office Specialist), Niki Winslow (NSM Division Administrative Coordinator)

Biology Adjunct Faculty: Pat Aldrich, Karen Bledsoe, Emma Dutton, Kelly Kissane, Scott MacDonald, Jeff Snyder

Biology Tenured-Tenure Track Faculty: Erin Baumgartner, Sarah Boomer, Bryan Dutton, Irja Galvan, Karen Haberman, Kristin Latham, Mike LeMaster

Chemistry Adjunct Faculty: Tom Barnes, Spence Russell, Sara Short

Chemistry Tenured-Tenure Track Faculty: Arlene Courtney, Patty Flatt, Rahim Kazerouni, Pete Poston

Earth and Physical Science Adjunct Faculty: Karen Brown, Don Ellingson, Jeremiah Oxford, Grant Smith, Phil Wade, KC Walsh

Earth and Physical Science Tenured-Tenure Track Faculty: Jeff Myers, Bill Schoenfeld, Steve Taylor, Jeff Templeton

Math Adjunct Faculty: Catherine Aune, Megan Boes, Avery Cotton, Steven Greco, Nick Husen, Stanley Leung, Dennis Spencer

Math Tenured-Tenure Track Faculty: Cheryl Beaver, Scott Beaver, Hamid Behmard, Laurie Burton, Maria Fung, Klay Kruczek, Mike Ward

*New Hires for 2009-2010*

Ava Howard, Plant Physiologist, Biology Department (Guralnick Tenure-Line Replacement)

Mary Beisiegel, Statistics and Math Education, Mathematics Department (Fung Tenure-Line Replacement)

*Division Leadership*

Steve Taylor (Earth Science) ended his first year of a three-year appointment as division chair on June 15, 2009. Department chairs in the division include: Hamid Behmard, Mathematics (chair for 2008-2009); Arlene Courtney, Chemistry; Rahim Kazeroni, Chemistry (substitute chair for Courtney sabbatical leave), Klay Kruczek, Mathematics (incoming chair for 2009-2010), Mike Lemaster, Biology; and Jeff Templeton, Earth and Physical Science (re-elected in June 2009 for a 3-year rotation).

*A special note concerning adjunct faculty and support staff:* while it is recognized that the tenured and tenure-track faculty at WOU represent the long-term investment in successful academic programs and curricula, student achievement would not be possible without the support and dedication of the fixed-term (adjunct) faculty and staff. Their long hours, hard work, dedication, and cumulative years of service to the NSM division are duly recognized and greatly appreciated. We quite simply could not accomplish our mission without their dedicated service.

## II. BIOLOGY DEPARTMENT

### a. Teaching

- Dr. Karen Haberman spent a portion of her sabbatical developing a significant research component for her Marine Ecology (BI 361) course. Students will participate in collection, sorting and identification of estuarine invertebrates as part of a larger project that assesses the recovery of tidal marshes in the Salmon River (Oregon) estuary after dike removal.

- Dr. Mike LeMaster served as a research advisor for two Honors students who completed their Honors dissertations this past year, Chelsea Miller (Biology major) and Kimber Saville (Psychology major).

- Undergraduate students participated in collaborative research with multiple faculty including Dr. Irja Galvan (Michael Petrovich), Dr. Karen Haberman (Dan Keller), Dr. Kristin Latham (Amanda Lakamp), and Dr. Mike LeMaster (Chelsea Miller and Kimber Saville).

- Dr. Mike LeMaster volunteered his time leading review sessions for students attending the OHSU Nursing Program on the Monmouth Campus.

### b. Scholarship

*Book Chapters*

Baumgartner, E., Zabin, C.J., Philippoff, J.K., Cox, E., and Knope, M.L. (2009). Ecological monitoring provides a thematic foundation for student inquiry. In: Yager, R. (ed.). *Inquiry: The Key to Exemplary Science*. Arlington, VA: National Science Teachers Association.

*Journal Articles*

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

Baumgartner, E. and Duncan, K.D. (2009). Evolution of students' ideas about natural selection through a constructivist framework. *The American Biology Teacher, 71(4)*.

Baumgartner, E., Phillips, L., and Kumabe-Maynard, E. (2008). Building ocean literacy through science and art. *Current: The Journal of Marine Education,* 24(3):18-23.

Boomer, S.M., Noll, K.L.*, Geesey, G.G., and Dutton, B.E. (2009). Formation of multilayered photosynthetic biofilms in an alkaline thermal spring in Yellowstone National Park, WY, USA. *Applied and Environmental Microbiology* (ASM Press), 75:2464-2475.

Chappell, P.E., Goodall, C.P., Tonsfeldt, K.J., White, R.S., Bredeweg, E., and Latham, K.L. (2009). Modulation of gonadotropin-releasing hormone (GnRH) secretion by an endogenous circadian clock. Journal of Neuroendocrinology 21(4):339-345.

*Presentations*

Baumgartner, E. (2009). Examining a new model of graduate education: The impact of NSF's GK-12 program on professional development of science graduate students. *Proceedings of the Oregon Academy of Science, 68,* 57.

Manning, T.F.*, Boomer, S.M., Parenteau, M.N., Dutton, B.E. (2009). Comparison of Chloroflexi from Two Different Photosynthetic Mat Communities in Yellowstone National Park – Preliminary Metagenomics Data and Future Aims, *JGI-MGM Workshop*, Walnut Creek, CA.

Parenteau, M.N., and Boomer, S.M. (2009). Progress Report – Chocolate Pots and Fairy Springs Metagenomic Analysis *JGI-MGM Workshop*, Walnut Creek, CA.

Taylor, S.B. and Dutton, B.E. (2009). Invasive Plant Distribution in the Luckiamute River Basin, Central Oregon Coast Range: Preliminary Analysis of Geomorphic and Land-Use Variables. *2009 Annual Meeting of the Association of American Geographers*, Las Vegas, NV.

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

LeMaster, M.P., Uhrig, E.*, and R.T. Mason. (2009). Temporal variation in the female sexual attractiveness pheromone of the red-sided garter snake, *Thamnophis sirtalis parietalis*. *Society for Integrative and Comparative Biology* (SICB), Boston, MA.

* *Current / Former WOU undergraduate student*

**c. Service**

During the past academic year:

- Dr. Erin Baumgartner attended the Portland Project Kaleidescope (PKAL) as a representative from Western Oregon University, served as a member of the National Marine Educators Association Ocean Literacy & Traditional Knowledge Committee, and was on the National Science Teachers Association *NSTA Reports* advisory board. In addition, she served as a reviewer for the ODOE Standards Revision and the Portland Project PKAL guidebook. Lastly, she was also a consultant for the Teacher Professional Development for Ocean Literacy project.

- Dr. Sarah Boomer was involved in reviewing six manuscripts from four different journals in the field of microbiology.

- 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, served as President of the WOU chapter of Phi Kappa Phi, and was recognized as the Outstanding Faculty Advisor for the 2008 – 2009 academic year. In addition to his service to the WOU community, Dr.

Dutton was assistant editor of the Vasculum, the Society of Herbarium Curators' official newsletter, provided a component to the Diack Ecology Education Program Field-based Ecological Inquiry Workshop, and was involved in reviewing manuscripts for two journals.

- Dr. Irja Galvan coordinated and presented multiple cadaver tours to the local high schools in the region.

- Dr. Karen Haberman was involved in reviewing a major grant proposal for the National Science Foundation and a manuscript from a journal in the field of marine ecology.

- 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.

- Dr. Mike LeMaster was a co-advisor for the Natural Science Club, assisted in cadaver tours for high school students, and reviewed several manuscripts in the field of chemical ecology.

**d. Student Achievement**

*Acceptances to Graduate Programs*

- Alex Baldwin — Pacific University Optometry Program (O.D.)
- Jessica Grabow — Texas A & M Biochemistry program (Ph.D.)
- Amanda Lakamp — University of Nebraska Medical Center (Ph.D.)
- Chelsea Miller — Pacific Northwest University of Health Sciences (D.O.)
- Nelson Morales — Roswell Park Cancer Institute (Ph.D.)
- Jake Owings — Oregon State University Pharmacy Program (Pharm.D.)
- Emily Uhrig — Oregon State University Environmental Science Program (M.S.)

*Acceptances to Undergraduate Programs*

- Lynn Van Winkle — OIT / OHSU Clinical Laboratory Sciences Program
- Samantha Colton — Pacific University Dental Hygiene Program

- Joshua Sizemore, Amada Dubois, Lori Bauke-Way, John Brun, David Hodge, Oscar Ramos, Carly Weberg, Megan Vorderstrasse — OHSU School of Nursing

- Jessica Baty, Christen Peterson, Shellaina Leitz — University of Portland School of Nursing

- Troy Stanley, Maribel Maciel, Kyann McAllister, Tiffany Thompson — Linfield College School of Nursing

- Charles Robinson — George Fox University School of Nursing
- Keshia Bigler — Denver School of Nursing

- Breanne Chambers Oklahoma City University School of Nursing
- Marco Listella Seattle Pacific University School of Nursing

*Special Recognition*

- Jessica Grabow Outstanding Achievement in Biology and Pre-professional Studies – NSM Awards Night
- Alex Baldwin Outstanding Achievement in Biology and Pre-professional Studies – NSM Awards Night
- Shelly Wimmer Outstanding Achievement in Principles of Biology – NSM Awards Night
- Emily Uhrig Phi Kappi Phi Graduate Studies Scholarship
- Chelsea Miller Finalist for the 2008-2009 WOU Julia McCulloch Smith Award

## III. CHEMISTRY DEPARTMENT

### a. Teaching

- GS 203 H is the LACC science component for the Honors Program. The third term was jointly taught by faculty members in Earth Science (Philip Wade) and Chemistry (Arlene Courtney). Two non-traditional approaches were used in teaching this course. First the students were exposed to many social networking tools for acquiring and sharing information. These tools included blogs, social bookmarking, RSS feeds, and photo sharing. Secondly, teams of students created documentary video productions on various energy topics. Students conducted research which often involved field trips or interviews, photography and/or videography. They wrote and recorded narrations and learned how to do video editing. The finished documentaries were presented during the Academic Excellence Showcase, and a DVD of eight documentaries is in production. The instructors will present the results of this project at a poster session of the fall 2009 GSA meeting.

- Students in the Ch 462 class conducted a water contamination study as a public service. The students researched methods for analyzing environmental samples for copper concentrations, acquired a series of water samples from the client's ranch in Calera, Oklahoma, conducted the analytical analyses, presented their findings in the form of a written report submitted to the client, offered suggestions for remediation of the problem and provided detailed instructions for removing stubborn residues left by the contamination. The project gave the students practical experience while providing a service to a landowner. This project exposed the students to various types if writing including a proposal, business letters, and a client report. The project required the students to take technical information and present it to a non-scientific audience.

### b. Scholarship

*Research Projects*

Pete Poston

- Conducted research analyzing of Rock Art Pigment from the Great Gallery, Maze District, Canyonlands National Park in Utah. In conjunction with this work he participated in the filming of a National Geographic special on Canyonlands National Park, Utah. Dr. Greg Swasey of the Denver USGS. This production has been scheduled to air during the second half of 2009. He also spectroscopically analyzed Barrier Canyon-style rock art using Near Infrared Spectroscopy and Raman Spectroscopy.

- Initiated analysis of possible impact-related extraterrestrial iridium and nanodiamonds temporally synchronous with the end of the Clovis Period of habitation 12,900 years ago.

He has been granted a research permit by the National Park Service for collecting samples from Canyonlands National Park in Utah. His initial investigations using electron microscopy involved two Western student collaborators. Dr. Poston has obtained a Faculty Development major research grant for this study.

- Poston, P., 2009, "Detection of Impact-Related Nanodiamonds and Magnetic Microspherules in a Younger Dryas Black Mat Using Transmission Electron Microscopy on Materials Sampled From the Maze District, Canyonlands National Park, Utah" (Pete Poston, funded $4375)

Patty Flatt

- "Pyralomicin Biosynthetic Gene Cluster Characterization": I have continued a collaborative research project with Dr.Taifo Mahmud from the College of Pharmacy at Oregon State University. The focus of this project involves the investigation of soil microbes and their ability to produce bioactive secondary metabolites. This research topic has been the focus of a recent NSF grant proposal where I am listed as the Co-PI on the project (see below). During the Spring Term of 2009 an undergraduate student at WOU, Travis Hoagland, assisted my efforts on this research as part of CH 401 Research Course.

- "Investigation of Mycosporine-like Amino Acid Production in Cyanobacteria": Genome-mining of the fully sequenced Nostoc punctiforme cyanobacterial genome has revealed the existence of a biosynthetic gene cluster related to that of the pyralomicins and other aminocyclitol containing compounds. To further investigate the secondary metabolites produced by this gene cluster, we have been investigating the biosynthetic potential of N. punctiforme and the gene expression pattern of novel biosynthetic gene cluster when exposed to ultraviolet radiation. In the fall, undergraduate students from WOU will be involved in characterizing these mutant strains for their biosynthetic potential. This project is the focus of a recent Faculty Development Research Grant awarded in December 2008 from WOU (see below).

- "Profiling Oregon Soil Microbes for Use in the Production of Biofuels and Medicines": The overall goals of this project are to involve undergraduate science majors at WOU in biochemical research exploring the potential use of soil microbes in the development of biotechnological and medicinal applications. This project is currently supported through a WOU Foundation Grant and is the topic for a grant writing workshop that I will be attending through the CUR program in July.

*Grants*

Pete Poston

- Poston, P., 2009, "Detection of Impact-Related Nanodiamonds and Magnetic Microspherules in a Younger Dryas Black Mat Using Transmission Electron Microscopy on Materials Sampled From the Maze District, Canyonlands National Park, Utah" (Pete Poston, funded $4375)

Patty Flatt

- Mahmud, T. (P.I) and Flatt, P.M. (Co-P.I.). (Submitted). A $380,184 grant application to the National Science Foundation entitled: 'Characterization of the Flavin-Dependent Halogenases from the Pyralomicin Biosynthetic Gene Cluster.'

- Flatt, P.M. (Dec, 2008 – Dec, 2009) $500 grant award from WOU Foundation Grant entitled, 'Profiling Oregon Soil Microbes for Use in the Production of Biofuels and

Medicines.'

- Flatt, P.M. (Jan, 2009 – Jan, 2011 ) $3,500 grant award from WOU Faculty Development entitled, 'The Biosynthesis of Photoprotective Mycosporine-like Amino Acids.'

- Flatt, P.M. (June, 2007- June, 2009) $12,000 grant award from the Oregon Agricultural Research Foundation entitiled, 'Genetic Engineering of Pseudomonas fluorescens as Biocontrol Agents'.

**c. Service**

Arlene Courtney

- Served as Oregon co-director for JSHS. Duties included assisting in the organization and hosting of the Oregon Junior Academy and Oregon JSHS symposia.

- Served as a sponsor/session chair for six 40 minutes seminar presentations at Academic Excellence and co-sponsor with Philip Wade for nine video presentations in a second session.

- Along with four Ch 462 students (Ryan Burge, Shawn Decker, James Dunning, and Cory Perkins) consulted with citizen Becky Woodruff, Calera, Oklahoma to determine the source of residential/ranch water contamination.

**d. Student Achievement**

*Acceptance into Graduate Programs*

| | |
|---|---|
| Christina Demke | University of Utah (Chemistry PhD program) |
| Shanley Young | John Jay University (Forensic Science) |
| Cory Perkins | Oklahoma State University (Chemistry PhD program) |

*Forensic Laboratory Positions Obtained*

Positions in forensic laboratories are very difficult to obtain since there are typically several hundred applicants for each opening. Three chemistry program graduates were successful in obtaining forensic laboratory positions in 2008.

| | |
|---|---|
| Brenda Vaandering | Las Vegas |
| Kaylon Wells | Oregon State Police Lab main facility Portland |
| Michael Jackson | Oregon State Police Lab main facility Portland |

*Other Achievements*

Cory Perkins - accepted into a summer REU (Research Experiences for Undergraduates) program at Oklahoma State University

Shawn Decker – recipient of NASA scholarship
Jennifer Blaser – Phi Kappa Phi
Jennifer Blaser - Outstanding Chemistry Major award – NSM Awards Night

## IV. EARTH AND PHYSICAL SCIENCES DEPARTMENT

**a. Teaching**

- Jeff Myers conducted two multi-day field trips to the John Day Basin and Cape Arago. These field trips were associated with ES 431/531 and ES392, respectively. Student learning outcomes

included understanding the geological relationships of fossils in the field, the use of fossils to interpret climatic and environmental conditions, and interpreting the depositional environment of sedimentary formations.

- Bill Schoenfeld prepared two new courses: (1) Physics 313, a new course which extended the calculus-based physics content of PH211-212-213; and (2) Physics 470/ General Science 606, new courses that were treated as group research projects in which each team member was assigned specific tasks to accomplish.

- Steve Taylor worked on the following curricular activities: (1) Collaborated with Dr. Templeton on changes to the Earth Science program curriculum (activities included additions of new courses, realignment of the math requirement, and updating of catalog descriptions); (2) Developed a new introductory course in Geographic Information Systems, ES341 Fundamentals of GIS. This course required significant development of all new lab exercises and tutorials to accommodate upgrade to ArcGIS9.X software from previous versions of ArcView 3.3; (3) Continued development of capstone assessment tools for Earth Science program and use in ES407 Senior Seminar; (4) Transferred all of pre-existing WebCT course materials (ES202, ES104, ES106, ES407) to the Moodle online course management environment; (5) Pilot tested real time audience response systems ("clickers") in ES473 Environmental Geology; and (6) organized the following field trips: ES458/558 "Hydrology and Geomorphology of the Middle Deschutes and Lower Columbia Rivers", NSM Division Fieldtrip "Environmental Studies in the Luckiamute Watershed, Polk County, Oregon", ES473/573 "Student Night at the Association of Engineering and Environmental Geologists Pacific Northwest Region; Portland State University", ES473/573 Environmental Geology "Hydrogeology and Aquifer Storage Recovery System at Dallas, Oregon", ES473/573 Environmental Geology "Solid Waste Management and Hydrogeology at the Coffin Butte Landfill, Benton County, Oregon".

- Jeff Templeton worked on the following activities: (1) Development of a new course, ES 354 (Volcanoes and Earthquakes) in Spring term. This course focused on earthquake phenomena and volcanic processes, with an emphasis on their impact to people, infrastructure, and natural resources in Oregon and the western United States; (2) Taught Earth Science 407 (Senior Seminar) the capstone experience for graduating Earth Science majors. The class theme was "Potential for a Large Mega-Thrust Earthquake along the Cascadia Subduction Zone in the Pacific Northwest". Oral presentations were conducted as part of the Academic Excellence Showcase event held on May 28, 2009; (3) Continued to refine the curriculum for the Introduction to Petrology course (ES 450) with development of active-learning strategies that require students to use microscopic petrography to solve geologic problems.

- Phil Wade's activities included: (1) update of GS313W/GS312 courses in response to Oregon Dept. of Education Core Science Standards Revisions and addition of innovative Google Earth activities; and (2) development of an honors science course with Arlene Courtney, GS203H. Activities included use of Blogs, integration of technology-based tools such as Flicker, Diigo, and RSS feeds, and leading students in development of video projects on alternative energy for presentation at the 2009 Academic Showcase.

- KC Walsh, a first-year adjunct in Physics, engaged the following: (1) Expanded the curriculum of the PH201-202-203 sequence to include 23 chapters of Knight/Jones/Field, *College Physics*, 1st. ed.; (2) added laboratory activities such as the Wimshurst machine, Van-de Graaff generator, Faraday flashlight, 50,000V hand held Tesla coil, and "Real Image" illusion demonstrations; and (3) integrated proven "PER" (Physics Education Research) methods to aid WOU students in their complicated journey to master physics.

**b. Scholarship**

*Research Projects and Grants*

Jeff Myers

- Conducted a study of the composition and climatic and environmental conditions indicated by the late Miocene Anaverde Flora of San Bernardino County, California. This work was in collaboration with Earth Science students Matt Buche and Alyssa Pratt, both of whom received paying internships to work on the project.

- Continued work on a student-based project developing WOU/community earthquake awareness and preparation, with students Matt Buche and Alyssa Pratt. The work generated a published abstract: Buche, M and Pratt, A.R. 2009. "Building a collaborative government-community earthquake awareness program". Proceedings of the Oregon Academy of Science Annual Meeting, Western Oregon University, Feb. 28, 2009, p.22.

Bill Schoenfeld

- Participated in two workshop presentations at the National meeting of National Science Teachers Association in Portland (October 2008). He also prepared two grant proposals: (1) "Addressing the New Content Standards: Physics Concepts for Elementary Educators", submitted to the National Space Grant Foundation ($24,000, not selected for funding); and (2) "Global Climate Change Institute for Teachers (GccIFT), Improving the Scientific Literacy of K-8 Teachers in the Pacific Northwest", in collaboration with Dr. Adele Schepige, submitted to NASA ($150,000 awarded with supplemental additions pending).

Steve Taylor

- Continued Research Project (work in progress): "Geomorphic and Anthropogenic Influences on the Distribution of Invasive Plant Species in the Luckiamute Watershed, Polk and Benton Counties, Oregon", in collaboration with Dr. Dutton and two undergraduate students. This year's work focused on land change analysis using historical air photos.

- Continued collaborative relationship with the Andrews Experimental Forest, Pacific Northwest Research Station (U.S. Forest Service). Working title of this research project is "The Influence of Geomorphic and Anthropogenic Processes on Decadal-Scale Sediment Yield in the Western Cascades, Oregon: An Updated Compilation of Experimental Watershed Data at H.J. Andrews Experimental Forest". This work forms part of a sabbatical-related Research Opportunity Award (ROA) funded by the National Science Foundation in Summer 2007.

- Re-submitted research proposal entitled: "Geomorphic Analysis of Late Quaternary Cinder Cones at Newberry Volcano, Central Oregon: Landform Evolution and Eruptive History in a Back-Arc Setting". Submitted to the Cole Research Award Fund at the Geological Society of America, Denver, CO ($14,000, unfunded).

- Co-PI and administrative signatory on proposal entitled: "Application of Spatial Statistics to Latent Print Identifications: Towards Improved Forensic Science Methodologies", with Emma Dutton, Oregon State Police; Bryan Dutton, WOU Biology, and Pat Aldrich, WOU Biology. Submitted to the National Institutes of Justice, Washington, D.C. (~$1.1 M, review pending).

Jeff Templeton

- Continued work on two research initiatives at Newberry Volcano near Bend, Oregon: (1) The objective of the first project is to constrain the petrogenetic evolution of the Newberry magma system using the Pleistocene ash-flow tuff deposits. Geochemical data and thin section studies

will form the basis for an abstract to be submitted in August for a presentation at the Geological Society of America National meeting in October 2009; (2) The second research project focuses on the numerous cinder cones that punctuate the landscape at Newberry Volcano. This project has entailed the development of a digital geologic map and spatial database for the volcano, in collaboration with Dr. Steve Taylor. We are planning to prepare a manuscript on this project during the upcoming summer.

- Continued disseminating the results of a curriculum improvement project that was funded through the National Science Foundation. I published an abstract and gave a presentation at the Oregon Academy of Science meeting held on the WOU campus in late February. For this project, I have developed a pedagogical model that integrates geologic problem solving with petrographic microscopy and digital image analysis in two courses in the Earth Science major at WOU. A key objective in the next year is to submit the curriculum development materials to the SERC website and to prepare a manuscript for the *Journal of Geoscience Education*.

- Collaborated with several colleagues (Rob Winningham, Bryan Dutton, and Steve Scheck) in preparing and submitting a manuscript for publication in the Council on Undergraduate Research Quarterly Fall 2009 issue, focusing on "How to Talk with Administrators about Undergraduate Research". We submitted an article prospectus in January and learned that our article idea was accepted in late February. Our manuscript, entitled "A Grassroots Faculty-Driven Initiative to Institutionalize Undergraduate Research: The Ins and Outs of Cultivating Administrative Support", was submitted in April, has been reviewed, and was recently accepted for publication.

- Upcoming sabbatical research goals in winter and spring terms 2010: (1) to complete and submit a manuscript entitled "Petrologic Constraints on the Evolution of a Continental Silicic Magma Chamber: Mickey Pass Tuff, West-Central Nevada", in collaboration with Dr. Anita Grunder from Oregon State University; and (2) to prepare a manuscript on the petrology of the Pleistocene ash-flow tuffs at Newberry.

- Initiated new work this past year with an undergraduate student (Brittnie Andrew) on a research project that focuses on a mafic dike system exposed in northwestern Arizona. A collection of samples that are well constrained by detailed field mapping are ideal for an undergraduate research project using petrographic microscopy and digital image analysis to study textural and phenocryst relationships within the dike.

Phil Wade

- Collaborated with Drs. Bill Schoenfeld and Adele Schepige on GccIFT: Global Climate Change Institute for Teachers Workshops: (June 2008 and August 2008) (~38 K-6 teacher participants). Participated in developing and conducting workshop curriculum.

- Supervised an M.S. Ed. Master Thesis project entitled "Google Earth in the K8 Classroom", with graduate student Tanja Aas (COE).

- Collaborator in the NASA-funded research project entitled: "Global Climate Change Institute for Teachers (GccIFT): Improving the Scientific Literacy of K-8 Teachers in the Pacific Northwest" (PI's are Schoenfeld and Schepia e.t al., NASA funding awarded for 2009-2011).

*Peer-Reviewed Publications*

- Jeff Myers, accepted, in revision, Cenozoic Paleobotany of the John Day Basin, OR. Geological Society of America Special Field Trip Volume, 2009 Annual Meeting, Portland, OR

- Steve Taylor submitted manuscript to Journal of Maps: "Surficial map criteria for sandstone landscapes of the Central Appalachians: An example from the Little River basin, Augusta County, Virginia, USA", with Dr. Steve Kite, co-author, West Virginia University.

- 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, *in press*.

*Presentations and Refereed Abstracts*

Jeff Myers

- OR Academy of Science Annual Meeting, Western OR University, Feb 28, 2009. Myers, J.A., Erwin, D.M., Schorn, H.E., Buche, M., Pratt, A.R.; "The late Miocene Anaverde flora: Chaparral with Avocadoes?" Proceedings of the OR Academy of Science, p. 19.

Steve Taylor

- Co-authored research presentation at the Oregon150 commemorative event at WOU, with Dr. Dutton. Presentation was entitled "Invasive Plant Species in Oregon's Past, Present, and Future: A Case Study in the Luckiamute River Basin, Polk County"

- Abstract published and paper presented paper at the National Meeting of the Association of American Geographers, Las Vegas, NV: "Invasive Plant Distribution in the Luckiamute River Basin, Central Oregon Coast Range: Preliminary Analysis of Geomorphic and Land-Use Variables", in collaboration with Dr. Dutton. Paper comprised part of a topical theme session entitled "Human Impacts on Watershed Processes".

Jeff Templeton

- Templeton, Jeffrey H., 2009, Thin section problem solving assignments: An inquiry-based, active-learning strategy for undergraduate Earth Science students: Proceedings of the Oregon Academy of Science, v. LXVIII, p. 54-55.

Phil Wade

- The Story of Global Climate Change. 1-hour workshop presented at National Science Teachers Association, Portland Meeting, October 2008. Presenter(s): Laurence Padman (Earth & Space Research: Corvallis, OR); Adele C. Schepige (Western Oregon University: Monmouth, OR); Deanie Anderson (Western Oregon University: Monmouth, OR); Susan Dauer (Western Oregon University: Monmouth, OR); William Schoenfeld (Western Oregon University: Monmouth, OR); Philip D. Wade (Western Oregon University: Monmouth, OR)

- Is Earth Catching a Fever? Illustrating and Assessing the Data. 1-hour workshop presented at National Science Teachers Association, Portland Meeting, October 2008. Presenter(s): Philip D. Wade (Western Oregon University: Monmouth, OR); William Schoenfeld (Western Oregon University: Monmouth, OR); Adele C. Schepige (Western Oregon University: Monmouth, OR); Deanie Anderson (Western Oregon University: Monmouth, OR); Laurence Padman (Earth & Space Research: Corvallis, OR)

**c. Service**

Don Ellingson

- Sponsored Bill Bradbury, former Oregon Secretary of State, as a guest speaker at WOU. The presentation emphasized the significance of global warming and climate change.

Jeff Myers

- President, Oregon Academy of Science, 2008-2009.
- Paleontological consultant, Paleoenvironmental Associates, Altadena, CA
- Professional memberships: Botanical Society of America, International Organisation of Palaeobotanists, Geological Society of America, Oregon Academy of Sciences

Bill Schoenfeld

- Oregon/NASA Space Grant Consortium – affiliate representative, 1 statewide meeting, assigned to two OSGC workgroups
- Reviewed E/PO proposals for NASA
- Presented two climate change workshops for elementary teachers, in addition to WOU colleagues, 2 undergraduates and 1 graduate student participated in workshop.
- Professional Memberships: NSTA (National Science Teachers Association), AAPT (American Association of Physics Teachers)

Steve Taylor

- Division Chair of Natural Sciences and Mathematics, Western Oregon University. The wide array of duties in this position include: budget management (~$200,000 supplies and services), personnel supervision (~40 faculty and staff), class scheduling, liaison with upper administration, student grievances, signatory duties on division paperwork, strategic planning, tenure and promotion work, building management.

- Served as Earth Science Advisor for K-12 Science Standards Review Panel, Oregon Department of Education, Salem, Oregon.

- Continued serving as faculty advisor and university liaison to the Oregon Geographic Information Council, Salem Oregon. The function of the organization is to set standards for acquisition of Geographic Information Systems data in the state of Oregon.

- Continued duties as a board member and chair of the Oregon State Board of Geologist Examiners (OSBGE), Salem Oregon. The function of the organization is to set licensing standards for professional geologists in the state of Oregon.

- Serving as member of the national exam committee and council of examiners, Association of State Boards of Geology, Columbia, South Carolina. The function of the organization is to establish national testing standards for professional geology registration throughout the U.S.

- Continued serving as faculty advisor and university liaison to the State Geologic Map Advisory Committee, Oregon Dept. of Geology and Mineral Industries, Portland, Oregon. The function of the committee is to provide guidance and set priorities for state and federal geologic mapping initiatives in Oregon.

- Continued serving as university liaison for the Luckiamute Watershed Council, Monmouth, Oregon. Supervised GIS project focusing on the 2008 Rapid Bio-Assessment, included supervision of student intern.

- Served as participating scientist and faculty mentor in the Summer 2008 and 2009 Ecoinformatics Institute at Oregon State University and HJ Andrews Experimental Forest. The six-week program involves 15 graduate and undergraduate students from institutions around the country. I worked in collaboration with Desiree Tullos and Julia Jones (OSU) to lead a river geology/rafting trip on the Deschutes River.

- Peer Reviews: (a) conducted peer review for a manuscript entitled "Cinder cone degradation as a function of age for the Quaternary Potrillo Volcanic Field, Rio Grande Rift, New Mexico", in a Special Paper on the Rio Grande Rift by the Geological Society of America; (b) conducted peer review for a river restoration proposal for the Bureau of Land Management, Publics Lands Institute, Las Vegas, NV; (c) conducted a book proposal review for Enironmental Systems Research Institute entitled "GIS Tutorial in Earth Science and Geology"; (d) conducted manuscript review for Journal Geomorphology, paper entitled "Size of cinder cones: the case of Tenerife (Canary Islands, Spain)"

- Conceived, organized, and proposed field trip to coincide with the October 2009 Annual Meeting of the Geological Society of America, Portland, Oregon. Pending field trip is entitled "Northwest River Rendezvous: Geomorphology, Whitewater Rafting, and Fly Fishing in the Lower Deschutes Basin" and includes participants from the following organizations: Bureau of Land Management, Deschutes River Conservancy, the Upper Deschutes Watershed Council, Portland General Electric, and Wasco County Soil and Water Conservation District.

- Maintained active membership in the following professional organizations: Geological Society of America, American Geophysical Union, Association of American Geographers, Friends of the Pleistocene.

Jeff Templeton

- Continued serving as Chair of the Earth and Physical Science Department. In May 2009, was re-elected for a third three-year term.

- Responsible for all scheduling, staffing, and related tasks for the Earth System Science sequence (ES 104, 105, and 106) lecture and lab courses, lower- and upper-division Earth Science courses, and Physics lecture and lab courses.

- Served as the Chair of the Academic Excellence Showcase Planning Committee. I had full responsibility for planning and organizing the campus-wide Academic Excellence Showcase held on May 28, 2009. Over 350 students presented their scholarly work at this highly successful event.

- Continued serving as the Coordinator of the Program for Undergraduate Research Experiences (PURE) at WOU for the 2008-09 academic year. Organized meetings of the PURE Executive Committee and related activities. In September 2008, met with new Provost and Dean of LAS to discuss PURE initiative and presented information about PURE and the Showcase to incoming faculty at New Faculty Orientation. Also, spearheaded the preparation of organizational documents, including bylaws and mission statement.

- Actively participated as a member of the Faculty Senate Ad Hoc Committee on LACC/General Education Review. Played a key role on the Sub-Committee that developed a Mission Statement and Learning Outcomes for the LACC and General Education at WOU.

- Professional Memberships: Geological Society of America (GSA); American Geophysical Union (AGU); National Association of Geoscience Teachers (NAGT).

**d. Student Achievement**

- Oregon Space Grant Student Scholarships: This was a record year for WOU students receiving Space Grant undergraduate scholarships ($6000) and graduate fellowships ($12,000).

Undergraduate: Shawn Decker - Chemistry - $2000; Laura Waight - Math - $2000; William Vreeland - Earth Science - $2000. Graduate: Avery Cotton – COE/MAT - $3000; Haley Kostrba – COE/MS Ed - $9000.

- Earth Science faculty and students were well represented at the 2009 WOU Academic Showcase, with a total of 4 faculty session organizers and 54 student presentations on topics including regional geology of the Pacific Northwest, Oregon seismic hazards, the Cascadia subduction zone, and applications of Geographic Information Systems to watershed analyses.

- Job Placement Updates for Earth Science Majors/Alumni: Matt Buche, Geologic Technician, Kane Geotechnical, Inc., Fresno, CA; Chandra Drury, Environmental Specialist, Maricopa County, AZ; Denise Giles, Watershed Restoration Specialist, Corvallis, OR; Heather Hintz, Interpretive Ranger, Oregon Caves National Monument; Josh Jones, Oilfields Permit Specialist, California Division of Oil and Natural Gas, Sacramento, CA; Jeff Kent, Hydrogeologist, Resolution Copper Mining, Superior, AZ; Katie Noll, Physical Science Teacher, Quality Schools International, Chengdu, China; Rachel Pirot, Engineering Geologist, Shannon and Wilson, Inc., Lake Oswego, OR; Amy Poff, Interpretive Ranger, John Day Fossil Beds, Dayville, OR; Ian MacNab, Environmental Geologist, Allied Waste Systems, Corvallis, OR; Julie Utley, Physical Science Teacher, Klein High School, Houston, TX;

- Internships and Research Experiences for Earth Science Majors: Brittnie Andrew, "Mafic Dike System of Northwestern Arizona"; Ryan Stanley, Land Change Analysis in the Luckiamute Watershed; Bill Vreeland, Rapid Bio-Assessment of Fish Populations in the Luckiamute Watershed; Thomas VanNice, Invasive Plant Surveys of the Luckiamute Watershed; Matt Buche and Alyssa Pratt, "Paleoclimate study of the late Miocene Anaverde Flora of San Bernardino County, California" and "Building a collaborative government-community earthquake awareness program".

- Earth Science Honors Students: Outstanding Lower Division Students: Brandon Snook, Bill Vreeland; Outstanding Upper Division Student: Ryan Stanley; Outstanding Graduating Senior: Matt Buche

## V. MATHEMATICS DEPARTMENT

### a. Teaching

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

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

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

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

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

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

**b. Scholarship**

*Publications*

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

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

Cheryl Beaver

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

Scott Beaver

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

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

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

Hamid Behmard

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

Laurie Burton:

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

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

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

Klay Kruczek

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

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

Mike Ward

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

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

*Presentations*

Cheryl Beaver:

- "Common error patterns in pre-service teachers' attempts at writing fraction word problems." Annual Meeting of the Pacific Northwest Section of the MAA, Central Washington University, April 2009

Scott Beaver:

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

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

Hamid Behmard

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

Laurie Burton

- "Fraction Bar Fun," Northwest Mathematics Conference, Portland, Oregon, October 2008

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

Klay Kruczek

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

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

Mike Ward:

- "Introduction to Proofs Class: Content and Effectiveness", Annual Meeting of the Pacific Northwest Section of the MAA, Central Washington University, April 2009 (Klay Kruczek presenting):

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

*Grant Writing Activities*

Cheryl Beaver, Laurie Burton, Klay Kruczek

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

Klay Kruczek

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

Mike Ward

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

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

**c. Service**

Cheryl Beaver

- Co-organizer for annual Sonia Kovalevsky Mathematics Day for High School girls
- Organizer of Mathematics poster session for WOU Academic Showcase
- Participated in “How to Succeed in Math and Science” during new student week
- Organized the session “Probability and Statistics for Non-Majors - Topics, Techniques, and Tips,” at the PNW NExT Meeting, Central Washington University, Ellensburg, WA.
- Judge, Undergraduate poster session at the Regional PNW MAA conference
- Co-organizer for a session at the Regional PNW MAA conference
- President Elect for 2009-2010 Teachers of Teachers of Mathematics, Oregon

Scott Beaver

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

Hamid Behmard

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

Laurie Burton

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

Klay Kruczek

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

Mike Ward

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

**d. Student Achievement**

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

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

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

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

- Laura Waight (Math 2010) received an Oregon Space Grant Consortium scholarship.

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

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