DIVISION OF NATURAL SCIENCES AND MATHEMATICS
2010-2011 ANNUAL REPORT

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I. EXECUTIVE SUMMARY

A. Division Highlights

The 2010-2011 academic year was associated with continued growth and infrastructure development in the Division of Natural Sciences and Mathematics (NSM). Forward progress in the WOU pre-nursing program stimulated continued trajectories in enrollment trends for 100- and 200-level biology and chemistry courses. Another round of campus-wide opportunity funds and stimulus monies resulted in continued equipment purchases and building renovation projects, as experienced in the previous two years. Significant events of note in the Division include: (1) sustained pre-nursing/professional enrollment trends (Chemistry 100-200 levels, Biology), (2) sustained demand for lower-level mathematics courses (MTH70, MTH95, MTH100-levels), (3) hiring of tenure-line replacement faculty in Biology and Mathematics, (4) completion of the NS004 lab renovation (Biology collections and upper division labs) (ES100 lab), (5) planning of NS201 (Microbiology) lab remodel and additional lab preparatory office space, (6) planning and funding of smart-room technology in NS114 chemistry lab (upper division, analytical), and (7) ancillary equipment upgrades including new new student computer workstations (Biology, Chemistry, Earth Science) and A&P data acquisition systems. At the same time, dedicated faculty and staff advanced other program areas and continued offering high-quality educational opportunities for the greater student population. The following is a summary of program highlights within the NSM division (*Note: for purposes of political balance, program summaries are presented in ascending alphabetical order in odd years and reverse order in even*).

The strengths of the NSM Division include:

- Academic programs that focus on quality teaching, close student-faculty interaction via individualized mentoring, small upper-division class sizes, inquiry-based laboratory and field experiences, and promotion of undergraduate research.
- The highly subscribed LACC 100-level lab science courses for non-majors significantly contribute to the Liberal Arts mission at WOU and provide students with opportunities for relevant, real-world problem solving. These courses also provide the foundation for pre-nursing and pre-education students.
- NSM faculty continuously strive to improve their respective curricula, embrace a technology-enriched learning environment, and implement meaningful assessment methodologies.
- NSM faculty actively serve as leaders on campus committees and regularly participate in a variety of professional service positions, both at the state and national levels.
- NSM faculty members are actively engaged in a spectrum of peer-reviewed research, publications, grant writing 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, a well-developed scholarship fund, a consistent record of post-baccalaureate student placement, and continued enrollment demand at all levels, including pre-nursing and pre-professional.
- The Chemistry program provides rigorous training for professional scientists, has established a strong record of alumni placement in graduate school, has developed a strong collaboration with

regional forensics laboratories, and is experiencing continued enrollment demand 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 Mathematics Department is nationally recognized for its math education program and is making significant contributions in the area of teacher preparation. This recognition combined with strong enrollment numbers at all levels attest to the success and assessment-driven curriculum work by the faculty.

- The 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.

B. Biology Department

- The enrollment numbers in Biology continue to show robust growth (~ 2800 students taking biology-related coursework during the 2010 – 2011 academic year). Enrollment in most majors courses remained at sustained high levels, with several courses reaching all-time high enrollments.

- Biology students (current and former) have been successful in their pursuit of biology-related careers. At least 9 current or former majors were accepted into professional schools and advanced degree programs (e.g. Education, Medicine, Veterinary, Nutrition). In addition, at least 17 advisees were accepted into professional undergraduate programs (e.g. Nursing, Dental Hygiene).

- The Biology Department continues to pursue opportunities to enhance laboratory space and technologies. Academic Infrastructure Committee funding was secured to remodel of NS201 (Microbiology Teaching Laboratory) which will significantly improve organization for shared equipment / prep areas, open space in other teaching labs, and improve research access. AIC opportunity funds were also procured for Human Anatomy & Physiology (A&P) data acquisition systems and enhancing student access in NS006 (Human A&P Teaching Laboratory).

- Collectively, Biology Faculty published 1 book chapter and 2 papers in peer-reviewed journals, with two other papers currently in the review process. They were involved in 10 refereed presentations at state or national meetings and workshops. Three of these were co-authored by current and/or former WOU students who contributed significantly to them.

- Biology Faculty continue to receive grant monies for their research. This past year, monies have been received from the Department of Justice (2-year total $685,000; co-authored with the Earth Science program and Oregon State Police), Oregon Sea Grant ($60,000 for this year – in review), and the WOU Faculty Development Committee (3 grants, totaling $6300).

- Biology Faculty contributed significantly to WOU governance, with notable representation on Faculty Senate, Committee on Committees, Institutional Review Board, Program for Undergraduate Research Experiences, Academic Excellence Showcase Planning Committee, Faculty Evaluation Committee, Scholarship Committee, Writing Intensive Committee, and the University Personnel Review Committee.

- Biology faculty members continued to provide individualized advising geared towards each student's interests and career goals. The department collectively advised ~350 students each term, with the majority carried by Dr. LeMaster (100-150 Pre-Nursing,) Dr. Dutton (70-90 Pre-

Medicine), and Dr. Latham (40-50 Pre-Pharmacy). Dr. LeMaster (WOU Academic Advisor of the Year Nominee) and Dr. Dutton (National Academic Advising Association Certificate of Merit) were both recognized for their outstanding advising. Our department members also continue to serve as the primary advisors for the Natural Science Club.

- Six Biology Faculty served as mentors for 16 undergraduate research projects, including one Honors Thesis. All of these projects involved students engaged in original research, generating original data. Four student research projects mentored by Biology Faculty were presented at the Academic Excellence Showcase.

- Biology faculty members continued to be actively involved in professional societies outside the WOU community with several taking on leadership roles at the local, regional, and national levels.

- Our department awarded more than $35,000 of scholarships to undergraduate Biology majors, with all tenure-track Biology Faculty providing valuable service on our departmental Scholarship Committee.

- A successful search was conducted to hire our new Cell Biology/A&P faculty member, Dr. Michael Baltzley who replaces Dr. Irja Galvan. Dr. Amy Harwell was also recently hired as a non-tenure track faculty member to teach in the non-majors A&P sequence and to serve the BI100 series.

C. Chemistry Department

- As anticipated, the CH100 sequence continued its upward growth driven by the demand of students attending Western in the pre-nursing program. The department offered four large CH 104 lecture sections during fall term with a total of 240 seats and 10 laboratory sections. This was an increase by one 24-seat laboratory sequence and twenty-four lecture seats. To accommodate the sustained enrollment, CH100 trailer sections in the sequence are being offered in both the academic year and summer session. Pre-enrollment data for Fall 2011 shows continued demand for this sequence with all sections, both lecture and lab, filled.

- Enrollments in other areas remained strong including upper division courses. Although few programs in other departments have continued to require organic chemistry (Ch 334-336), enrollments remained relatively constant due to the number of second year chemistry majors and students pursuing chemistry minors and forensic science minors. Other upper division courses showed increased enrollments during 2010 -2011 as well. For example, one of our chemistry capstone sequences Ch 461-462 had an enrollment of ten students, the largest number since the introduction of the course while six students were enrolled in Ch 407 and presented capstone seminars. Ch 345 Introduction of Toxicology was offered for the first time during Spring 2011 with a very strong enrollment of 26 students.

- In terms of program development, the Department gained approval of a new Medicinal Chemistry/Pharmacology option as well as two new minors, Medicinal Chemistry and Pharmacology: Natural Science Track and Medicinal Chemistry and Pharmacology: Health and Community Track. We anticipate strong enrollments in both the major and minor curricula in upcoming years.

- The Chemistry Department graduated four majors in 2010-2011 with one student earning the traditional chemistry degree and three students completing the requirements of the forensic chemistry option. Western's chemistry graduates are competitive in the employment market and in admissions to graduate and professional schools. There are currently five graduates at various stages in PhD programs throughout the United States, 2010-2011 graduate Tyrone Morato will be entering the graduate school at the University of Oregon and former graduate Dallas Swanson will be entering medical school in the fall. Our Forensic Option graduates have been very

successful in obtaining positions in the Oregon State Police (OSP) forensic labs as well as labs in other states. Open positions are few. In an average hiring situation, students have a less than 1% chance of successfully gaining a position. During 2010-2011, two Western graduates, Carly Sizelove and Kaylon Wells, were selected for forensic scientist positions in the OSP Portland laboratory. One of our graduates also obtained a position with the Department of Energy at the Hanford, WA facility.

- Smart room technology and computers at individual workstations were available for the full year for the first time in NS115. This allowed the integration of computer and video technology into the nursing chemistry, organic chemistry and applications in forensic chemistry laboratory courses. These computer facilities were also used in teaching CH350 Chemical Literature and CH407 Seminar. A variety of electronic data sensors were purchased that will foster development of innovative new experiments in 2011-2012. Funds for computer and smartroom upgrades in NS114 were also procured from the Academic Infrastructure Committee AIC to serve upper division chemistry courses.

D. Earth and Physical Sciences Department

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

- Earth and Physical Science faculty members actively served as professional leaders in their fields. Professional service activities include: member of Oregon Dept. of Education Science Content Assessment panel (Wade), member of review panel for NSF-supported Science Education Resource Center teaching activity collection (Templeton), leadership in state-level geoscience advisory boards (Taylor), participation in NASA Oregon Space Grant Program (Schoenfeld), co-chair Geology section of Oregon Academy of Science (Myers), and collective faculty membership and participation in professional societies (American Association of Physics Teachers, American Geophysical Union, Association of American Geographers, Council on Undergraduate Research, Friends of the Pleistocene, Geological Society of America, International Organization of Palaeobotanists, National Association of Geoscience Teachers, National Science Teachers Association, and Oregon Academy of Science).

- Earth and Physical Science faculty members continue to be actively engaged in a wide spectrum of peer-reviewed research, publication, and related professional development. Dr. Myers prepared a consulting report on the Pliocene floras of the San Joaquin Formation in southern California. Dr. Templeton continued research on tephra geochemistry at Newberry Volcano, Oregon and was PI on an NSF grant proposal to upgrade the ES100 laboratory curriculum at WOU (with Taylor and Wade as Co-PIs). Dr. Taylor continued watershed research in western Oregon and continued work on a NIJ-funded finger print analysis project with Biology colleagues (Dutton, Dutton, Aldrich). Dr. Schoenfeld continued NASA-funded sabbatical research on children's book content and reading perceptions related to Earth system science. Current (2010-2011) active research grants and pending proposals related to EPS Department faculty total approximately $0.9 M (Refer to Appendix 1. Faculty Reports for additional information).

- 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 8000 student credits hours (SCH) during the 2010-2011 academic year, accounting for 25% of the total production in the Division of Natural Sciences and Mathematics.

- The Earth and Physical Science programs continue to grow in a sustainable manner, in parallel with overall university trends. ES100 LACC enrollments and retention are very strong.

- The 2010-2011 academic year was associated with a notably robust participation in the undergraduate research program in Earth Sciences. A total of 9 students were actively engaged in research with projects funded by NASA Oregon Space Grant, Oregon Watershed Enhancement Board, and the National Institutes of Justice. Research projects focused on geographic information systems, fingerprint analysis, watershed research, river restoration, Newberry geochemistry, igneous petrology, cinder cone analysis and landscape modeling with high resolution Lidar. Students actively engaged the profession and presented their work at the WOU Academic Showcase and the Association of Engineering Geologists spring section meeting in Portland.

E. Mathematics Department

- The Mathematics Department sponsored a very successful graduating class in 2011. Dania Morales will be going on to pursue a master's degree in mathematics at Oregon State University. Matt Schmidgall will be pursuing a post graduate degree in rhetoric at Oregon State University. Tim Sasaki and Kady Hossner will be entering M.A.T. programs at WOU and Multnomah University, respectively. Finally, Andrea Olson will be interning as an actuary at Standard Insurance Company.

- The Mathematics Department worked closely with SEP to help their students with MTH 70 and MTH 95. We have introduced Supplemental Instruction Tutors, where a mathematics major meets twice a week for one hour with the SEP students to help them understand the material in the courses, create better study habits, and adjust to college life more easily. Chris Tasner and Anna Kralovec worked as mathematics majors in this program.

- Long-time Mathematics faculty member Klay Kruczek resigned from the university to tend to family matters in the eastern U.S.

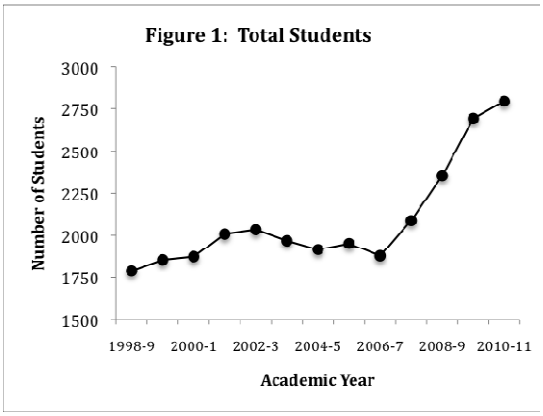
- The Mathematics Department was excited this year to complete three successful faculty searches, 2 tenure-track hires and one visiting professor hire. These include Beseigel replacement Matt Ciancetta, from CSU Chico and Kruczek's replacement Breeann Flesch. A visiting professor position was opened to help cover planned sabbatical-related replacements over the next several years.

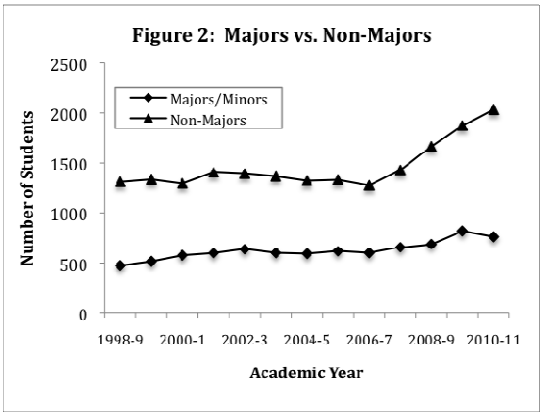
- Mathematics students participated in a wide variety of presentations and Department faculty continued to serve in campus, state, and national leadership positions.

II. ENROLLMENT TRENDS

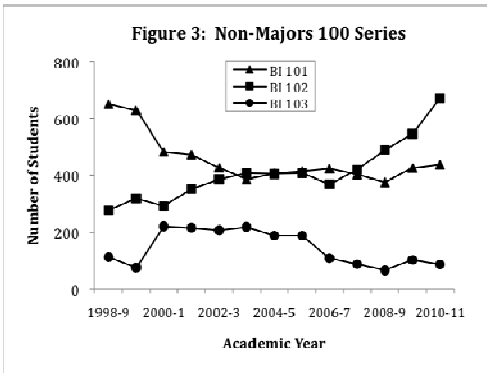
A. Biology

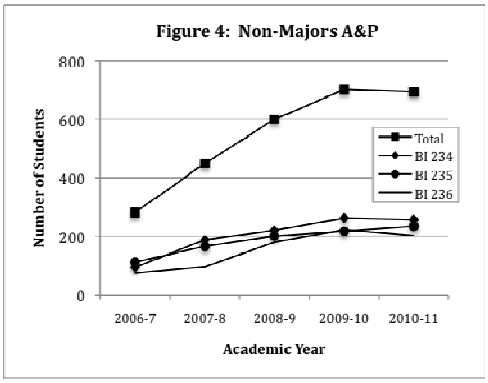
- As described above, there has been continued enrollment growth in nearly all Biology courses. During the 2010-11 academic year, the Biology Department teaching personnel included seven tenure-track (TT) faculty (two full professors, two associate professors, and three assistant professors) and four full-time, non-tenure track (NTT) faculty; we were notably down one TT, owing to Dr. Galvan's late-spring 2010 retirement announcement. Although theoretical classroom hours available for our current faculty total 432 (1.0 FTE = 36 hours/TT faculty; 45 hours/NTT faculty), this value does not represent the actual hours available given reassignment time awards totaling ~40 hours, including: Department Head, PURE Coordinator, 100 Series Coordinator, PLTL Coordinator, and research/grant-provided. Refer to Figures 1 through 6 below for graphical summary of historic Biology enrollment trends.





Enrollment Trends – Non-Majors





1. 100 Series: (Figure 3, adjacent)
BI 102 (Pre-Nursing, Health-PE, LACC) showed the most robust growth. New pre-req changes should allow more students to take BI 103, and relieve some BI 102 pressure.

2. Non-Majors A&P/BI 234-5-6: (Figure 4, adjacent)
Although the adjacent graph suggests BI 234-5-6 (Health-PE, Pre-Nursing) enrollment has leveled off, Dr. LeMaster closed nearly all sections once seats filled, owing to a lack of FTE. New minimum grade requirements should alleviate some of these pressures.

3. Non-Majors Microbiology/BI 318: (no graph)
The situation for BI 318 is similar to BI 234-5-6: leveling off because we are out of FTE and space. The NS201 remodel should alleviate some of these pressures.

4. Human Heredity (HH)/BI 441: (no graph)
Between 1998-2007, HH enrolled ~15 students/term. Now required for the Human Biology Minor, enrollment in HH shot up to 38 in 2009, and 55 (overloaded!) in 2011. This growth has not been noted in previous reports – and will provide a challenge for Dr. Latham's teaching schedule.

Enrollment Trends – Majors

Figure 5: Majors 200 Series

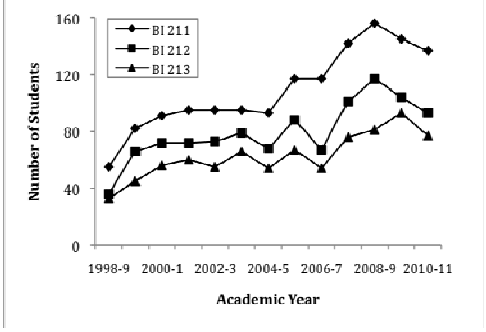
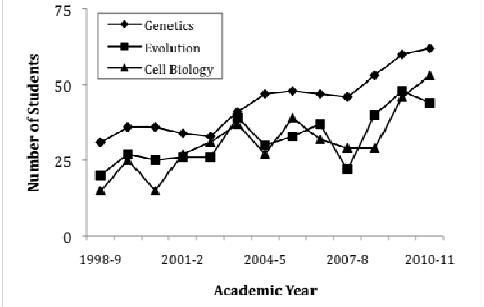


Figure 6: Majors 2nd Year Core



1. 200 Series: (Figure 5, adjacent)
Although BI 211 (60-70% Pre-Professional Health) initially filled, efforts to provide early testing and advising encouraged more under-prepared students to drop mid-way through the term. Even with these efforts, there is still a high (30-40%) F/D rate. We anticipate the new BI 211 trailer will allow for improved preparation and retention.

2. Second Year Core/BI 314-5-6: (Figure 6, adjacent)
While Genetics/BI 314 and Cell/BI 315 showed increased enrollment, Evolution/BI 316 dipped slightly – perhaps because students chose to take other, competing advanced courses - all of which were extremely well enrolled this spring (see #3 below).

3. Notable Advanced Coursework: (no graph)
The following electives experienced record enrollment: Human Dissection (doubled), Immunology (doubled), Insects (doubled), and Molecular (quadrupled). Many other courses (e.g. Majors Microbiology, Ecology, Vertebrate Anatomy, Vertebrate Physiology, Natural History) were full/closed.

B. Chemistry

- The Chemistry Department has continued to experience growth in the Ch 104-106 sequence. To meet student demand, we added one additional laboratory section for fall term and 24 lecture seats. We also staffed an off-sequence lecture section with two laboratory sections and offered the entire three-term sequence during summer 2011. The enrollment in this course requires two adjunct faculty positions in addition to a partial load of one tenured/tenure-track faculty member. Comparison of enrollments for Fall 2007 with those of Fall 2010 shows the rapid growth that has occurred in this service sequence.

	Total Ch 100 sequence
Fall 2007	132
Fall 2010	265

- During the period 2007 to 2010, this sequence for fall term has increased from one Ch 104 lecture section with three labs to four large lecture sections with ten labs and one fall Ch 106 lecture section not existing in 2007. The total enrollment/pre-enrollment for Ch 104-106 in summer 2011 at the time of this report is 45 students. This enrollment has held relatively constant for a two year period.
- Enrollment in Ch 221 was abnormally low in Fall 2010 while the enrollment in Ch 223 from the 2009-2010 off-sequence course was unusually high. This does not appear to fit any trend as the Ch 221 pre-enrollment for Fall 2011 shows a closed enrollment of 72 students with 15 students enrolled in the 2010-11 Ch 223 off-sequence course.
- Upper division courses showed either steady or increased enrollments. Ch 334-336 enrollments have remained steady over a four-year period although the requirement of this course in Biology

programs other than pre-professional (medical fields) programs has been removed. We experienced increased enrollments in Ch 313, 461, and 462 to all time high levels in 2010-2011.

C. Earth and Physical Sciences

- The Earth Science program has experienced a steady number of graduates (range: 4-8) since 2001 and a stable enrollment in upper division major-minor courses (range: 6-18, average: 11). Earth Science enrollments have been increasing over the past 5 academic years (2006-2011). Total student credit hour production increased 15%, ES100 enrollments 10%, and ES200 enrollments have stabilized at ~40-45 students in fall term. The upper division population is steady, with a consistent range of 7 to 15 students per course. Cumulative growth rate in these areas is around 10% annually, approximately paralleling overall university trends. Ten-year average annual student credit hour production (SCH) in the program is ~8200, second in magnitude to Biology in the division (average annual ~9400 SCH over the same time period). The program is economical and efficient, with the highest annual credit-hour production per faculty-staff member (~400 SCH per faculty-staff) and the lowest salary:SCH ratio in the NSM Division. The program generates $400,000 to $500,000 of net profit, above faculty/staff salary costs, on an annual basis.

- 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).

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

D. Mathematics

In the Mathematics Department, the courses serve four types of clientele: our courses for mathematics majors, the service courses (mostly MTH 70, MTH 95, MTH 105 and MTH 111) satisfy the general population; MTH 211 – 213 and MTH 396 serve pre-service K – 8 teachers, and MTH 392 – MTH 398 and MTH 492 – 495 are for 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 had remained steady in the mid-30's over the previous years, but it seems we have more mathematics majors coming up. Our introduction to proofs class, which is taken by mathematics majors early in their time here, has increased from an enrollment of 20 students to almost 30 students in the past couple of years. With the result of the credit switch (from three to four credit) of upper level mathematics courses, students need to take less upper division electives. Although we used to offer three electives per quarter, we are down to offering at most two per quarter because of this reduction in required electives. The reduction in the number of electives required and the increase in the number of mathematics majors / minors may counteract each other, but we still feel we will only be offering at most two electives each quarter. This reduction in electives offered 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. For the 2010 – 2011 academic year, we increased the number of sections of MTH 105 offered each quarter to

three because the two sections of this course filled up so quickly each quarter. These sections still filled up. We may need to go up to four sections each quarter, but we are waiting to see the effect of last year's increase in the number of sections on future years. It seems more freshmen are able to get into the class now, which was our goal.

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 now been handled. In the past students who placed into MTH 112 had to wait until the winter to begin taking mathematics. This also delayed these students from taking MTH 251. With the reallocation of resources due to the reduction of upper division mathematics electives offered, the department offered another sequence of MTH 112 (fall), MTH 251 (winter) and MTH 252 (spring). We also do not know what the effect of the nursing program will be on the enrollment in MTH 243. We will have the visiting professor, Matthew Nabity, teach some of the sections of MTH 243 to introduce a new perspective on the course.

The enrollment in the introductory mathematics courses for preservice K-8 teachers has been steady, but we plan to offer a different trailer sequence of the foundations sequence (MTH 211 – 213) beginning in the spring 2011 to help students who miss one course in the sequence. We will still offer five sections of these courses each quarter (Fall 2011: 2 sections of MTH 211, 1 section of MTH 212, and 2 sections of MTH 213). The department continually encourages students who excel in the foundations sequence 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. We do not yet know the effect of the change in the degree requirements for pre-service K – 8 teachers put forth by the College of Education last year. All pre-service early childhood / elementary teachers will have to take one more mathematics class, but they will no longer choose two focus areas. This could increase the number of mathematics "focus" classes offered, but so far it has not really had an effect on the enrollment..

Even with the increase in sections in our general education courses, the numbers for July indicate we may need to add a section of each of these general education classes since MTH 70, MTH 95, MTH 105, MTH 111, MTH 243, and MTH 251 each have less than 10 seats left in each class (with 3 SOARs still to go).

III. SUMMARY OF PROGRAM CURRICULUM CHANGES

A. Biology

Course	Nature of Change	Status	Justification
BI 103	Dropped BI 102 pre-req	In New Catalog (INC)	To manage enrollment and improve access for LACC students given Pre-Nursing/Health-PE pressure in BI 102.
BI 234	Added minimum grade pre-req, content swapped with BI 235	INC	To manage enrollment and improve preparation; aligns with minimum grade pre-req's in Health-PE, Pre-Nursing.
BI 235	Content swapped with BI 234	INC	Movement of immunology to BI 234 (above) to better prepare Pre-Nursing/Health-PE students taking BI 318.
BI 318	Added minimum grade pre-req	INC	To manage enrollment and improve preparation; aligns with minimum grade pre-req's in Health-PE, Pre-Nursing.
BI 211	Added statement about new winter trailer	INC	To manage enrollment and improve access for under-prepared students who not ready to take BI 211 in the fall.
BI 213	Dropped BI 212 pre-req	INC	To manage enrollment and allow late-starters to better move through first-year sequence.
BI 314	Added Math 111 pre-req	INC	To manage enrollment and improve preparation.

BI 315	Changed pre-req's to BI 213, BI 314, and just CH 221	INC	To manage enrollment and improve preparation; allows late-starters to better move through second-year sequence.
BI 316	Changed pre-req's to BI 212, BI 314	INC	To manage enrollment and improve preparation; allows late-starters to better move through second-year sequence.
BI 326	Changed course title and description	INC	Reflects instructor and field changes in last 10 years; aligns with developmental biology courses across country.
BI 331 (W)	Added BI 314 pre-req (WR 135 more emphatic)	INC	To manage enrollment and improve preparation to this third/fourth year course; BI 331 (W) has the most limited lab space in the building.
BI 357 (W)	Added Math 111 pre-req Stated BI 211-2-3 all req Some description changes (WR 135 more emphatic)	INC	To manage enrollment and improve preparation to this third/fourth year course; BI 357 (W) has limited lab space in the building.
BI 454 (W)	Added Math 111 pre-req Stated BI 211-2-3 all req Some description changes (WR 135 more emphatic)	INC	To manage enrollment and improve preparation to this third/fourth year course; reflects instructor and field changes in last 10 years
BI 100X	"New" course	INC	Although "temporary" BI 100X courses have been taught since 1997, we created this new zero-credit version in order to reduce course costs and better encourage "at-risk" students to take this proven study aid course.

B. Chemistry

- A new major degree option in Medicinal Chemistry/Pharmacology was approved (new catalog).
- A new minor in Medicinal Chemistry/Pharmacology-Natural Science Track was approved (new catalog).
- A new minor in Medicinal Chemistry/Pharmacology – Health and Community Track was approved (new catalog).
- A new course Ch 345 Toxicology was added to the catalog and offered during Spring 2011 (new catalog).
- A new course Ch 322: Medicinal Chemistry and Pharmacology was approved (new catalog)
- Ch 347: Biochemistry of Complementary and Alternative Medicines was approved (new catalog)

C. Earth and Physical Sciences

- No program curriculum changes were undertaken this year. Current programming is properly scaled to student and industry needs.

D. Mathematics

The Mathematics Dept. engaged a few minor course changes:

- The prerequisites on MTH 338, MTH 341, and MTH 441 were altered to reflect the current feeling of the department of prior knowledge in order to succeed in each of these courses.
- MTH 72 and MTH 97 were added as new supplemental instruction courses supported by SEP for MTH 70 and MTH 95, respectively.

IV. PROGRAM ASSESSMENT ACTIVITIES AND RESULTS

A. Biology

Biology Faculty continued to develop and facilitate programmatic and/or course assessment. Given the large numbers of courses and diversity of collected data (e.g. demographic information aimed at tracking, enrollment management, and/or student preparation issues; pre/post content surveys driven by course learning outcomes, attitudinal questionnaires aimed at understanding students' perceptions about subject matter and/or course/lab features), Biology Faculty efforts have been summarized in the following assessment table (extensive departmental assessment reports are available upon request):

	Nature of Assessment					
Topic	Demographic	Content	Attitude	Other	**Results**	**Faculty**
BI 101	X	X	X	Exam Frequency Study Habits	Pending	Baumgartner Howard
BI 102	X	X	X		Pending	Baumgartner
BI 103	X	X	X		Pending	Baumgartner
BI 211	X	X	X	At-Risk Advising Active Learning	Provided – Annual Report	Boomer Latham
BI 212		X			Pending	Dutton Haberman
BI 213		X			Pending	LeMaster Howard
BI 318	X		X		Provided – Annual Report	Boomer
BI 331	X		X		Provided – Annual Report	Boomer
BI 314	X		X		Pending	Latham
BI 316		X			Pending	Dutton
BI 461		X			Pending	Dutton
BI 361		X	X	Course Structure Sea Grant-Driven	Pending	Haberman Baumgartner
ETS Exam		X		Programmatic	Pending	Dutton*
Exit Survey	X		X	Advising Career Placement	Provided – Annual Report Three-Year Compilation	Boomer*

*Biology Faculty who assisted with ETS/Exit Survey administration: Baumgartner, Boomer, Dutton, Haberman

B. Chemistry

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

Formative Assessment

- Traditional methods including quizzes and exams taking the form of essays, multiple choice, true/false, and problem solving
- In class assessment using clicker technology
- Individual and group oral presentations
    - poster presentations
    - powerpoint presentations
- Significant writing component including
    - laboratory notebooks
    - formal laboratory reports
    - annotated bibliographies
    - abstracts
    - web page development
- Critical thinking skills are tested via the solving of laboratory unknowns and the development of research questions

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

Formative Assessment highlights:

- The use of clickers in lectures to give immediate feedback of the level of understanding of a topic being discussed which allows the instructor to adjust the lecture and increase student learning. Clickers were used in each lecture, and student progress tracked in Ch 334-336. Clickers were employed by two of the three instructors in the Ch 104-106 sequence.
- The Ch 334-336 sequence was assessed through the administration of the American Chemical Society standardized organic chemistry examination, and the results compared to national norms. Within the OUS system, performances at the 50^{th} percentile or above are considered to show successful mastery of organic chemistry at the upper division level. The results for the Ch 336 students in Spring 2011 showed that 61% of the students in the class scored at or above this level and 33% of the class scored above the 65^{th} percentile with two students scoring at or above the 90^{th} percentile (90^{th} and 95^{th} percentile).
- Use of embedded GRE and MCAT style questions within the CH 450/451 exam material to gauge the proficiency of these students in the area of biochemistry for entry into professional and graduate school.

Summative Assessment

Summative assessment is accomplished via capstone courses and a national, standardized exit exam. Students are required to complete two capstone offerings Ch 461/462 (a two term, inquiry-based laboratory course) and Ch 407 (presentation of a public literature or research seminar). Ch 461/462 is offered alternate years and was offered in 2010-2011.

- Senior seminars are presented during the Academic Excellence Showcase and evaluated by a panel of judges using a scoring guide. The panel of judges has been identical for the last several years allowing direct comparison of the seminar ratings. The compilation of judging panel scores showed this year's seminars to be of well done both in the quality of the organization, oral presentation and in the area of depth of knowledge of the topic. The mean overall score was 179/200 (range 170-190) compared to a mean of 189/200 (range 173 – 198) for 2009-2010 and a mean of 171/200 (range 130-192) for 2008-2009.

- The ETS Field Test for Chemistry was administered to graduating students for the three years prior to 2010-2011. The exam results from 2009-2010 became available during the 2010-2011 reporting period and will be discussed here. There were four students who took the exam in 2009-2010, three graduating in spring 2011 and one student graduating in winter 2011. The mean of this student sampling based on national norms was a 70^{th} percentile with one student scoring in the 90^{th} percentile. This exam is not a perfect fit for assessing WOU chemistry graduates due to the coursework differences existing within the Department's two degree options. These curricular differences are necessary for providing appropriate career preparation in the two options. The ETS exam contains a significant biochemistry component which fits the students in the Forensic degree option (required course) but not those in the traditional program where it is can be taken as elective if desired. The results for 2009-2010 clearly show this as students taking the exam scored in the 10^{th} percentile in the area of biochemistry. This was not an unexpected result as, of the four students in the sample, only one had taken a course in biochemistry. On the other hand for this group of graduates, the institutional mean in the area of inorganic chemistry was the 85^{th} percentile. This was a function of the fact that three of the four students in the testing sample had completed courses in advanced inorganic chemistry, a course not required or even recommended for the Forensic Option. The ETS exam contains a subset of questions assessing critical thinking skills. The mean of Western students in the area of critical thinking was the 70^{th} percentile. We find this to be a positive assessment as teaching students how to evaluate and think critically is the most important skill we can give them for success in their ultimate careers.

- In 2010-2011, we administered the American Chemical Society diagnostic examination that has been recently developed to assess the skills expected of an ACS certified chemist. Although Western's chemistry program is not ACS certified, this exam appears to be a better tool for assessing problem-solving skills than the ETS exam we have administered previously. This exam requires students to apply chemical concepts from several core chemistry areas to proposed scenarios rather than answer the type of single subject-oriented objective questions found in the ETS assessment tool. This test was in its third year of national use in 2010-2011. The examination was administered to the students in the Ch 407 capstone seminar course. This year the Ch 407 course consisted of three graduating seniors and three students who will be at Western all or part of 2011-2012. Our student results ranged from the 84th percentile to the 14th percentile. To get a sense of how students performed in different broad areas of chemistry, the exam questions were catalogued by content areas, and the student performances logged. Note: there are no national norms for student performances in the different content areas of chemistry, and the results presented below are not related to any percentile rankings but are simply percentages of correct answers obtained for questions that have been catalogued at Western into broad areas of chemistry. The questions were catalogued into the broad areas of (1) Analytical and instrumentation; (2) General/Inorganic; (3) Organic and organic spectroscopy; and (4) Physical. Results obtained from this year's exam:
    - Analytical area - 46% correct responses
    - Inorganic area – 46% correct responses
    - Organic area – 54% correct responses
    - Physical area – 44% correct responses

  At this point in time, we are not sure what the results of this analysis tells us with our small sample of participants. We hope a 3-year period of exam administration will give us sufficient data to begin to use this as a tool for program assessment.

C. Earth and Physical Sciences

- The Earth Science program submitted a five-year report to the Oregon University System. Taylor prepared the bulk of this report, with assistance from Templeton in summer 2010.

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

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

- Summative Assessment of Degree Program: The capstone course, Senior Seminar (ES 407), continues to serve as the primary Degree Program Assessment mechanism for Earth Science graduates. The objective of Senior Seminar is for students to conduct in-depth study and research on current topics in the Earth Sciences. By requiring Earth Science students to draw on information from the full range of major courses they have completed during their time as an undergraduate, students must demonstrate proficiency in a broad range of Earth Science content areas. Students are required to complete ES 407 during the final term of their senior year and must satisfactorily

complete the capstone course to graduate from the program. Senior Seminar has been successfully incorporated into the campus-wide, Academic Excellence Showcase event sponsored by the Program for Undergraduate Research Experiences and Phi Kappa Phi.

- In conjunction with seminar inquiry-based, work-sample method described above, standardized exit exam models have been explored by Earth Science faculty members. One summative assessment strategy that has been pilot tested is the nationally standardized Fundamental Geology Exam that forms part of the Oregon State Board of Geologist Examiners professional licensing process. Since this initiative began, a total of 6 WOU Earth Science alumni have taken the OSBGE Fundamental Geology (FG) exam and all have met the passing requirements.

D. Mathematics

- Major Field Test in Mathematics given to seniors (Finished in 90th percentile in the nation): Administering the Major Field Test, in mathematics has become part of the curriculum for students taking Senior Project (MTH 403 and MTH 404). We continue to be impressed by the student results. In the past, the seniors had finished in the 90th percentile as a class. This year, Tim Sasaki missed one point on the entire exam. 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 this high consistently is very impressive. The results show that the WOU Mathematics Department is very effective compared with mathematics departments nationwide.

- Exit Interview for graduating seniors: An exit interview is given to graduating seniors as well. The interviewer records the student's spoken answers to the questions below and saves them onto the network (the student's name is never recorded). The exit interview's questions focus on student involvement in activities and program involving mathematics both inside and outside the department, plans after graduation, advising (academically and for a career path), and comparing their experience to their friends' experiences in other departments. The department plans to compile the data in the future.

- Applied mathematics major assessment: While advising students this past year, we realized students were avoiding proof intensive courses by pursuing the applied mathematics track of the mathematics major. Our intention when creating the applied mathematics track was to better prepare students interested in getting a job in industry. The courses currently listed in the applied mathematics track are appropriate, but do not expose the students to enough proofs if they are interested in going into graduate school. To correct this issue, the department will be adjusting the degree requirements for this track by requiring the students to take at least two proof-intensive courses. This proposal will be put forth during the 2011 – 2012 academic year.

- Senior Project: Scott Beaver supervised the Senior Project I - II (MTH 404 and MTH 404) last year. This course includes writing a capstone paper, which in most cases would be an expository paper based on a published mathematics paper. The students in this course also present their papers in two one-hour lectures to their fellow classmates and the rest of the department. These presentations are video taped and archived as part of the mathematics department assessment plan. They also present a summary of their paper at the Academic Excellence Showcase. Copies of the rubric for senior paper and presentations are available upon request. Each year, the faculty who is in charge of Senior Project I – II (MTH 403 and MTH 404) is also responsible for archiving the documentation.

- Embedded Assessment: The Mathematics Department has an embedded assessment plan in place. Each faculty carries out parts of the plan relevant to his/her department teaching and assignments (archiving samples of student writing and exams, conducting exit interviews, etc.) During the fall, the department will compile the data from the spring. Copies of embedded assessment ideas acquired during the spring can be found in Appendix 2.

- Assessment of the Effectiveness of Online Homework: We continue to assess the value of online homework, which is given in MTH 70, 95, 111, 112 and the calculus sequence. This is still in its

initial stages, so there is no true data yet, only anecdotal evidence that students find the online homework system effective. We have realized assigning online homework is not enough, so most instructors assign written homework as well. The written homework can either be short projects or standard homework assignments consisting of problems.

V. SWOT ANALYSIS

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

1. Biology

- Biology Faculty are strongly committed to undergraduate education. All are active in all aspects of the university, including teaching, university governance, and research.
- As a department, we have made strides towards updating and enhancing our laboratories and teaching laboratory budgets to improve equipment, and to emphasize more cutting-edge laboratory exercises.
- Biology Faculty have embraced assessment as a means to provide empirical evidence for making programmatic and/or course changes with a specific emphasis on improving student preparation, managing enrollment, and better tracking/advising students.

2. Chemistry

- The Chemistry Department is composed of three tenured, one tenure-track, two full-time adjuncts and two specialty adjuncts from the Oregon State Police crime laboratory. This faculty is capable and versatile with each member able to teach in more than one area within the program and is the department's most valuable resource.
- One strength of the department is the commitment of the faculty to integrate innovative activities and projects into the curriculum.
    - Students work on research projects as part of laboratory coursework
    - Innovative use of technology
        - Project-based content learning through video production, web authoring, computer application design, etc
        - Use of clicker methodology to assess student learning during lecture
        - Hands on use of laboratory instrumentation including the opportunity to set up and learn how to operate instruments from manuals, etc.
- WOU possesses the only program within the OUS system that is uniquely designed to train students in the area of Forensic Chemistry while using OSP professionals to teach the techniques currently used in the working forensic lab.
- The Department will be the only chemistry program within the OUS system offering a unique concentration in pharmacology and medicinal chemistry at the undergraduate level.
- The quality of WOU chemistry graduates is demonstrated by competing favorably for employment within the region
- The quality of WOU chemistry graduates is demonstrated by success in graduate programs. We currently have graduates pursuing advanced degrees at Oregon State University, the University of Utah, Oklahoma State University, Colorado State University, the University of Oregon and the John Jay College of Criminal Justice (the foremost graduate program in forensics in the U.S.)

3. Earth and Physical Sciences

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

- The Earth Science program has a faculty:student ratio that is conducive to one-on-one contact, personalized instruction, and promotion of undergraduate research.
- The Earth Science program is one of the campus leaders with respect to service contributions to the Liberal Arts Core Curriculum and pre-education programs. The ES100 sequence (ES 104-105-106) that serves approximately 1400 students per year, is a common first destination for

entering freshman, and has a notably high retention rate between fall, winter, and spring terms. ES100 encourages real-world problem solving and is appealing to non-science majors.
- Earth Science faculty members embrace a technology-based curriculum and are working to implement standardized program assessment tools.
- Earth Science faculty members actively serve as leaders on a number of campus-wide committees and serve in a variety of professional capacities.
- Earth Science faculty members are enthusiastically engaged in a wide spectrum of peer-reviewed research, publications, and related professional development.

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

4. Mathematics

- One of the biggest strengths of the department is the senior project, required of all mathematics majors. Although sometimes these projects do not contain original research, we continually send mathematics majors to local and national conferences to give talks. Frequently, our students win awards for their presentations. As evident by the results on the Major Field Test and the awards won at local and national conferences, we have effective degree requirements for our mathematics major. Our majors go into teaching, graduate school, and industry after graduation.

- The mathematics preparation of pre-service K – 8 teachers at Western has been recognized by the National Council on Teacher Quality. We have a fairly unique program for the preparation of middle school mathematics teachers as well, since the majority of middle school mathematics teachers outside of WOU are trained as K – 8 teachers (not enough mathematics content) or as high school teachers (not the appropriate content and not enough pedagogy). We have the perfect blend of content and pedagogy for these future middle school mathematics teachers. Because of our involvement at national conferences on the preparation of middle school mathematics, three members of our department and a former member (Maria Fung, now of Worcester State College) were asked by the Mathematical Association of America to compile a volume of articles on this subject. This volume should be finished up this year.

- The department instills a confidence with the mathematics majors when they take MTH 311 – 312 (Advanced Calculus I – II), which is taught using the Moore Method (a deductive manner of instruction used in advanced mathematics courses). This course, usually taken during a major's senior year, requires students to prove theorems and present their proofs in front of the class at the board. We feel this method has helped students become quite comfortable at the board, which presumably serves them well once they are in the high school classroom, where the majority of our students end up. Also, in their senior year, and at various places prior, students are offered the opportunity to learn LaTeX (a typesetting program for scientific work) to help make their work look professional. This too will presumably serve them well in their future teaching.

- The department, as a whole, is involved in the local and national mathematics community. Cheryl Beaver. Laurie Burton, and Klay Kruczek have been active with three local organizations, either as members or consultants, involved with the training of teachers: TOTOM (Teachers of Teachers of Mathematics), OMEC (Oregon Mathematics Education Council), and ORMATYC (Oregonn Mathematical Association of Two Year Colleges). In September 2010, Western Oregon University hosted the annual meeting of TOTOM, where Cheryl Beaver was president for the year. .Klay Kruczek served as communications office of the Pacific Northwest Section NExT. Laurie Burton and Klay Kruczek served on COMET (the Committee on the Mathematical Education of Teachers), a national committee, and Cheryl Beaver served on the Mathematical

Association of America's Committee on Minicourses. Each member of the department also give talks and chair sessions at local and national conferences. For example, Scott Beaver gave a presentation in Washington D.C. in June entitled, "A Modified Moore Method for Small Advanced Calculus Classes of Predominantly Future High School Teachers."

- The department serves in a number of leadership positions on campus as well. Scott Beaver began his term as chair of the Collective Bargaining Team in the fall. He served as the Faculty Union the past couple of years. Klay Kruczek served as the secretary of the Academic Requirements Committee for 2010 - 2011. Hamid Behmard will be President of Phi Kappa Phi and Chair of the Faculty Development Committee for 2011 – 2012. We also run a couple each of oral presentation sessions and poster sessions at WOU's annual Academic Excellence Showcase.

- We have the rare feature of a department in that we all get along famously. Even with our minor disagreements on issues, we feel we are a collegial department who respect each other and stand by any departmental decision. Even though Cheryl Beaver and Laurie Burton are the organizers of the annual Sonia Kovalevsky Day held at WOU for high school girls interested in mathematics, the other members participate by either organizing a session or helping with set up. This is just one example of how our department works as a team. Our friends at other universities are always amazed when we tell them we all get along, do not have factions, and share the workload evenly.

- One of the biggest strengths for our students is our building, the Marc "Ted" Winters Building. Our mathematics majors use the two study lounges frequently to work with each other on homework and for studying for exams. It is also great to have four SMART classrooms, with one being a 40 station computer lab. We really feel these are selling points when talking to students at the variety of recruitment events we offer at WOU. The building also contains an on-site testing center, which works really well for administering make up exams, placement exams, and the numerous skill tests we offer throughout the quarter.

- While talking to other colleagues across the country, we have learned we are fairly unique in that the tenure-track faculty usually teaches a good number of the sections of MTH 111 College Algebra. This is a great opportunity for us to learn what sort of background these students might be lacking. We then try to discuss this with our graduates who teach high school to see if they can help with these issues. This year, the tenure-track faculty members were unable to teach many sections of MTH 111 because of a tenure-track faculty shortage, but we plan to have this change during the 2011 – 2012 academic year with our new hires.

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

1. Biology

- Enrollment growth provides an opportunity, so long as it is appropriately managed and supported.
- The diverse capabilities of Biology Faculty allow for a good balance of new research programs and experienced leadership and mentoring, so long as other workload demands remain in check.
- A combination of on-campus venues (e.g. PURE/Academic Showcase, Biology Scholarships, and Faculty Development Grants) and off-campus funding (e.g. Department of Justice, Oregon Sea Grant) have directly or indirectly supported a rich array of student-faculty research projects.

2. Chemistry

- The opportunity to attract students in pre-nursing by packaging current forensic course offerings as well as a new course offerings in toxicology/pharmacology into a 12-hour upper division block that could be used in the nursing program to prepare students for the rapidly developing area of Forensic Nursing.

- Have the opportunity to upgrade our offerings in the areas of biochemistry, toxicology, medicinal chemistry and pharmacology to prepare students for graduate work in these areas.
- Continue our interaction with the OSP crime lab by integrating lab experts into our curriculum and maintaining student intern positions within the laboratory. After working with OSP professionals, our students fare well in acquiring forensic employment within the system in an area that has a limited employment market.
- With new computer acquisitions, we have the opportunity to further expand our use of technology in the classroom and laboratory.

3. Earth and Physical Sciences

Key opportunities for the Earth Science program include the following:

- Lower-division Earth Science enrollments have been increasing over the past 5 academic years (2006-2011). Total student credit hour production increased by 15% and ES100 enrollments by 10%. The upper-division population remains steady with a consistent number of degrees awarded. The program is economical and efficient, with a high annual credit-hour production per faculty-staff member (~400 SCH per faculty-staff) and a low salary:SCH ratio. The Earth Science program is profitable.
- A key aspect of the program is the close alliance with faculty in physics, chemistry, biology, and education. Faculty members from different disciplines work directly together on a daily basis and cultivate a multi-disciplinary, collegial atmosphere that is unique compared to other institutions. The cross-disciplinary alliance in NSM provides a superb opportunity for faculty and students with diverse interests to interact in a rich and stimulating academic environment. Earth Science plays an important role by providing a nexus for studies in the biological and physical sciences. In this regard, Earth Science faculty are instrumental in supporting a growing alliance of NSM faculty and programs that provide integrated, interdisciplinary field-based courses and research opportunities in Natural Science disciplines. In addition, there is a common linkage between majors and minors in Earth Science, Geography, and Environmental Studies. As such, a significant number of students share common classes in each of these programs.

Key opportunities for the Physics program include the following:

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

4. Mathematics

- With the addition of Rachel Harrington to the College of Education a couple of years ago, we have an opportunity to collaborate with her on teaching a few more courses for in-service middle school mathematics teachers. These courses are usually primarily offered in the summer, and we have had low enrollment for these courses in the last few years. We are hoping with Rachel's involvement in the local schools, we can offer these courses more often during the regular portion of the academic year and offer courses that may appeal to the needs of these in-service teachers. Cheryl Beaver and Klay Kruczek have already collaborated with Rachel on a paper about middle school mathematics teacher training.
- The department would like to see more outreach locally. It would be great if the department had regular meaningful contact with the public schools (Central High School, Talmadge Middle School, and Ash Creek Elementary School) beyond sporadic student teaching.

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

1. Biology

- Based on provided annual reports, the most consistent and serious challenge raised regards research. The majority (7/11) of annual reports asserted this challenge, including from NTT faculty. Although 2010-11 saw a larger number of undergraduate-faculty research projects, our overall/collective publication and presentation rate is down from 2009-2010. Adding to this challenge is the growing expectation that some NTT faculty want to participate in research, a situation that is raising questions – minimally, about space and resource allocation, and the performance review/evaluation process.

- The second serious challenge regards the fact that enrollment is being allowed to skyrocket without a concomitant hiring of more tenure-track faculty. As reflected by some negative student feedback (e.g. Exit Survey), this is decreasing our ability to offer advanced electives in a timely manner. In particular, required organismal and A&P (both Human and Animal) coursework for Pre-Professional, Zoology, and General Biology emphases is suffering from a lack of seats and faculty expertise. It is also effectively increasing our advising workload, which has also resulted in some negative student feedback.

- The third serious challenge regards space. Simply put: there is no more room in the building, which means that even if we could hire another tenure-track faculty member, there would be no office/research space for him/her. And even with our existing faculty, expanded teaching and research space and equipment needs/demands, the level of turf-related issues this year has only exacerbated other workload frustrations.

2. Chemistry

- Finite resources for maintenance of the Department's instrument holdings, upgrading of instruments to state-of-the-art models and acquisition of expensive forensic instrumentation and basic chemical instrumentation such as a nuclear magnetic resonance spectrometer. Such instrumentation frequently costs in excess of $100,000 for the initial purchase and brings with it ongoing operational costs.

- Lack of space for instrumentation. Under the current situation, some instruments must be housed on laboratory benches in teaching laboratories occupying valuable student work space. For example, in NS 114 as many as 10 upper division students must so all of their work on two laboratory benches because the remainder of the lab bench space is occupied by instrumentation.

- There is a limited market demand for forensic specialists. This challenge is met within the curriculum by providing our Forensic Option majors with the skills needed to be marketable as bench chemists.

- To accommodate any further growth of the Ch 104-106 sequence to meet the demand of the pre-nursing program without making sacrifices in other programmatic areas.

- Weakness in the area of Quality Assurance/Quality Control training within our curriculum. This is an area that would increase the desirability of our students to potential employers.

3. Earth and Physical Sciences

- The most immediate challenge facing the Department of Earth and Physical Science at present is the pressing need for a full-time lab preparator. We currently share a half-time position with the Biology Dept. Growth in both the ES100 and BI100 introductory LACC laboratory science courses has made it challenging for the current staff member to accomplish all of the tasks that

could and should be completed. A full-time, dedicated EPS lab preparator would remedy this situation.

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

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

- An ongoing challenge is also associated with the teaching load required of faculty. The standard teaching assignment requires 12 contact hours per week (36 FTE contact hours per academic year), with lecture hours counting for 1 FTE contact and lab hours counting for 0.66. The teaching load combined with maximum-capacity class sizes results in little time available for other faculty duties such as scholarly research, program planning / assessment, and professional service. As such, the bulk of the latter activities must be conducted after hours, on weekends, and during the summer. An additional challenge presented by the relatively high teaching load is that associated with depletion of creative energy and "teacher burnout".

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

Physics program challenges include the following:

- The most urgent challenge faced by the physics program is the lack of a second tenure line which limits the ability to offer upper division courses and to plan for programmatic upgrades. The physics program is caught in a classic "Catch-22" predicament. Low enrollment in upper level physics courses ensures departmental and division discussions for future hires go to disciplines other than physics. The lack of a major in physics, and regular upper level course offerings

prevent the already small number of interested students from actually choosing physics. Student enrollment numbers in physics courses outside of require engineering coursework across the country have been low for many years now, and is likewise manifested at WOU.

- A high number of weekly student contact hours (typically 15-16) prevents faculty from fully engaging in scholarly and professional activities.
- Another challenge involves entering students who are ill-prepared for the quantitative problem solving demands that a university level physics class thrusts upon them.

4. Mathematics

- The department could really use another tenure-track faculty member. This past year, Cheryl Beaver, Laurie Burton, and Klay Kruczek primarily taught the courses designed for pre-service K – 8 teachers. They all wish to have a more diverse teaching schedule, but with the limited number of faculty members who can teach these courses, their schedules were forced to be heavy in the areas of teacher education. They are all trained as Ph.D. mathematicians, who enjoy teaching mathematics education classes, but would prefer to also teach any number of the service courses, calculus courses, and or courses for mathematics majors. The hiring of Matt Ciancetta should alleviate some of those issues.
- Over the years, we have noticed we need to offer more and more sections of MTH 70, MTH 95, and MTH 111. We cannot continue to increase the number of sections of each of these courses for a variety of reasons. First, we just do not have the classroom space on campus to increase the number of sections of each course. We have already begun to offer evening classes to free up classroom space during the day. Increasing the number of sections offered also requires the hiring of more non-tenure-track faculty members. Office space for non-tenure-track faculty is an issue in our department. The offices for these faculty members are already small. Putting two full-time faculty members in an office just creates so many problems. Because the offices are so small, an instructor cannot be in the office while the person has office hours. We are hoping offices open up in Maaske Hall.
- In spite of limited time for the immersion required by mathematical research, we have worked hard as a department to stay active in our specific areas. In particular, as a department, each of us averages over one publication per year. What makes this even more impressive is that there is a turnaround time of over a year per submitted paper for some of the mathematics journals we publish in.
- We encourage our students to take an introduction to proofs class (MTH 280) during spring quarter of their freshman year. The next time they see a proof-intensive course (MTH 344) is usually during their junior year. We might consider a bit more continuity in the sense of reducing the lull in proof-based courses.
- Because we hired three people this year, this took away from our time to dedicate to research, assessment of the program, and assessment of the lower level courses. We hope next year will run more smoothly.

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

1. Biology

- Advising has become a serious vulnerability, not only because it is consuming our collective workload but also because of increasing student feedback (e.g. Exit Survey) regarding requests for more career-focused services (e.g. covering more areas, more non-WOU and/or out of state programs, more facilitation of practicum/in-the-field activities).

- We have long prided ourselves in offering a broad training in the field of Biology for undergraduates. Although 2010-11 saw increases in graduating majors with Botany or Ecology emphases, the continued increase in freshman-level students who state they are solely interested in Pre-Professional Health Science fields (especially those who do not understand the demands of this track and/or are under-prepared) continues to challenge our ability to provide appropriate course access and advise – particularly when weighed against our desire to serve our more diverse and committed upper classmen.

- Increases in tenure-track faculty positions have not kept pace with increases in student numbers. We believe that the department has been able to build a strong reputation in recent years but, without investing in additional tenure-track faculty positions, we foresee drops in recruitment and retention as we increase class sizes, reduce class availabilities, cut program offerings, and continue to see diminished student satisfaction.

2. Chemistry

- Reliance on adjunct personnel to meet the demands of pre-nursing program students in the Ch 104-106 sequence. This reliance places us in jeopardy due to the volatile nature of such teaching positions. For example, we lost one excellent adjunct instructor when a more lucrative industrial position became available during the 2009-2010 academic year. It also has become necessary to hire a third part time adjunct to cover laboratory classes for Fall 2011.

- Added pressures to increase enrollments in upper division electives. Cancelling courses that are offered in an alternate-year mode is damaging to students in programs such as the Environmental Studies minor, and removes the ability of students to explore some of the non-core areas of chemistry. Students have commented that they do not want to register for some upper division electives due to the fear of those courses being cancelled due to low enrollment numbers.

3. Earth and Physical Sciences

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

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

4. Mathematics

- We currently lack a tenure-track member of the department who can teach the statistics courses needed for a student to go into actuarial sciences or graduate school in statistics. That is a major weakness. Klay Kruczek was thinking about pursuing a M.S. in Statistics on his sabbatical, but he is leaving WOU to be closer to his family in Connecticut, so that void will still remain.

- In the next few years, we expect the departure of a few of our non-tenure-track faculty members. In particular, we need another experienced teacher of MTH 105, since the only person who teaches this course (Dennis Spencer) plans on retiring in the next couple of years. If we were to add another tenure line, this new hire could fill one of our major gaps in mathematics education, statistics, and mathematics for liberal arts majors.

VI. OTHER PROGRAM PLANNING AND INITIATIVES

A. Biology

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

B. Chemistry

- We have administered the ACS exam for organic chemistry at the end of the three-term sequence to assess the learning of WOU students relative to national norms for more than six years.

  Planning: Review a series of assessment exams available for measuring learning relative to national norms for other courses in our program. We will evaluate how closely those exams align to the course content taught in the 10-week quarter system as many exams are geared for the 15-week semester system. The ACS assessment exams are available for the following course offerings:
  - General Chemistry (for Ch 221-223 sequence) – exams available for measuring learning on a conceptual level, traditional (algorithmic) style or a pairing of the two approaches. Exams are available for evaluating on a term-by-term basis or for use at the end of the full year sequence.
  - General, Organic, Biochemistry (for Ch 104-106 sequence) – exams available for use at the end of the full year sequence or as the subsets of general, organic and biochemistry. National norms are only available for the full year exam.
  - Biochemistry – an exam available for a one semester course that might be an appropriate instrument to assess our two term course sequence.
  - Analytical Chemistry
  - Instrumental Analysis
  - Physical Chemistry – exams available to evaluate topical portions of physical chemistry content as well as a comprehensive exam. There is no exam that fits the abbreviated Ch 340 course in the Forensic and Medicinal Chemistry Options.

- We will continue to monitor the performance of students for several years using the American Chemical Society diagnostic exam as an exit exam for assessing the skills needed for our graduates to be successful chemists. Planning includes:
  - Administer this exam for a 3-year period and evaluate the results as they relate to our programs.
  - Change our practice of requiring the exit exam for completion of Ch 407 for all enrolled students. Some students choose to complete the seminar requirement a year earlier than their year of graduation and before they have completed all chemistry courses.
  - Investigate possibilities of making a student exam score part of that student's permanent university record to encouraging students to prepare for taking the exam like they prepare for taking the GRE, MCAT etc.
- Investigate possible ways to assess skills of students seeking entrance to the 100 and 200 sequences. Planning includes:
  - Review commercially available diagnostic exams such as
    - The California Chemistry Diagnostic Test for Undergraduate Placement (diagnostic placement exam created by faculty from the University of California)
    - The Toledo Exam (an exam in three parts assessing math competency, general chemistry knowledge and specific primarily descriptive chemistry knowledge)
  - Investigate the creation of a WOU specific exam
- Evaluate the Forensic Chemistry Option curriculum to ensure that the coursework provided at WOU follows the American Academy of Forensic Sciences (AAFS) guidelines. Planning includes:

    - Investigate the possibility for obtaining accreditation of our program from the AAFS.

- Environmental chemistry is an area of growing importance in the Pacific Northwest as well as throughout the U.S. Employment opportunities are growing for our students in this area. We would like to better prepare our students for working in this area. Planning includes:
    - Investigate the ACS recommendations for environmental chemistry programs.
    - Develop a degree option combining chemistry courses with an interdisciplinary environmentally-related minor to prepare students for further graduate study or employment in the environmental sector.

C. Earth and Physical Sciences

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

D. Mathematics

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

VII. PUBLIC RELATIONS ITEMS FOR PROGRAM PROMOTION

A. Biology Department – None to report at this time.

B. Chemistry Department

- A new degree option in Pharmacology/Medicinal Chemistry added to the Chemistry major. This is a unique program within the OUS system.
- New minors in Pharmacology/Medicinal Chemistry, a Natural Science majors track and a Health and Community track, were added to the department curriculum.

C. Earth and Physical Science Department

- The best promotional nugget for this year is the growing undergraduate research program in Earth Sciences sponsored by the efforts of Templeton and Taylor. A total of 9 students were actively engaged in research during the 2010-2011 academic year with projects funded by Oregon Space Grant, Oregon Watershed Enhancement Board, and the National Institutes of Justice. Students actively engaged the profession and presented their work at the WOU Academic Showcase and the Association of Engineering Geologists spring section meeting in Portland. Student-related research projects involve geographic information systems, fingerprint analysis, watershed research, river restoration, geochemistry and igneous petrology.

D. Mathematics Department

- Sonia Kovalevsky Day: The Math Dept sponsored its 7th annual Sonia Kovalevsky Day this past February. SK Day is a program of hands-on workshops and talks for high school women students and their teachers, both women and men. The purpose of the day is to encourage young women to continue their study of mathematics and to assist the teachers of women mathematics students.
- Major Field Test: The mathematics majors continue to do very well on this exam.
- Student talks and awards: Since August 2010, our mathematics majors have given talks at MathFest 2010 – 2011 (the annual summer conference of the MAA), the annual meeting of the Pacific Northwest section of the MAA, the Northwest Undergraduate Mathematics Symposium, and the Nebraska Conference for Undergraduate Women in Mathematics.
- Laurie Burton is the co-author for the ninth edition of the Mathematics for Elementary Teachers: A Conceptual Approach textbook and the ninth edition of the Mathematics for Elementary Teachers: Activity Approach workbook published by McGraw Hill January 2012.

E. Division of Natural Sciences and Mathematics

- The Division of Natural Sciences and Mathematics extensively participated in the May 2010 Academic Showcase event sponsored by the WOU Program for Undergraduate Research (PURE) and Phi Kappa Phi. NSM Division faculty and student participation has grown over the past five years of the event. Faculty members Bryan Dutton from Biology and Jeff Templeton from Earth Science have provided dedicated leadership for Academic Showcase planning and operations, since it's inception in 2006.

VIII. NSM DIVISION FACULTY AND STUDENT HIGHLIGHTS

Refer to attached annual department and faculty reports for 2010-2011.