



**MONTANA UNIVERSITY SYSTEM**  
**Office of the Commissioner of Higher Education**

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TO: Montana Board of Regents  
FROM: Joyce A. Scott, Deputy Commissioner for Academic & Student Affairs  
RE: Campus Analyses of Trends in Graduate Degree Productivity

The first graduate degree outcomes report is submitted to the Board with the Academic and Student Affairs Committee's agenda. Data come from annual campus reports to the National Center for Education Statistics (NCES) and are organized by the Classification of Instructional Programs (CIPs).

This memo offers commentary to aid in understanding. Each campus was invited to comment on:

- major events that have affected graduate program productivity (budget cuts, loss of TA stipends, or other factors),
- forces that caused the elimination of graduate programs (accreditation, low enrollment, etc.), and
- circumstances that dictated the creation of new programs in selected disciplines.

Individual campus reports with respondents indicated appear below.

**Montana State University - Bozeman**

**Adjustments in Degree Titles**

Dr. Joseph Fedock, Vice Provost at Montana State University-Bozeman, explained the changes in graduate degree titles that affect data trends. Most were due to internal reorganization, program review, or institutional decisions to discontinue degrees. The College of Agriculture restructured its doctoral programs and no longer awards the doctorate in either *agronomy* or *soil sciences*. The approved degree title is Ph.D. in Plant Science-Plant Genetics Option. The campus also offers a -Plant Pathology Option.

In engineering, data show Ph.D.'s in *Chemical, Civil, Electrical and Mechanical Engineering*. These data represent students who entered the programs before 1996 when they were still authorized. In 1996, the degree designation changed to Ph.D. in Engineering. Students who have graduated in the Applied Mechanics option are categorized in the Engineering, General group.

In education, students who graduated in any of the three authorized Ed.D. options--Curriculum & Instruction, Adult & Higher Education, and Education Administration - have been categorized in Education, General since 1996.

Formerly, MSU used the *Biochemistry & Biophysics* category, but now all degrees are included in the Ph.D. in Biochemistry. In other fields, MSU-Bozeman discontinued: *Earth and Planetary Science* since 1993; *Veterinary Clinical Sciences* since 1994. Degrees formerly awarded as *Ph.D. in Veterinary Molecular Biology* are now IPEDS-categorized under Molecular Biology.

## Master's Degrees

Dr. Bruce McLeod, Dean of Graduate Studies, was appointed full-time dean of Graduate Studies in 1998, and MSU made a formal budget allocation to that office at that time. This marked a turning point in graduate education and led to increased attention to graduate programs across the campus.

Since then, Master's degrees have increased in enrollment and productivity. The percentage of master's applications approved--as compared to those submitted--has grown substantially. Many departments require a "pre-application" by which prospects submit standardized test results. While this reduces the overall number of graduate applications, it also ensures better-prepared students and greater likelihood that an applicant will be admitted.

Montana State currently offers 40 master's degrees. This past year MSU-Bozeman awarded a record 330 master's degrees. Active recruiting by departments, individual faculty, and Graduate Studies will continue to bring positive results. However, faculty working with graduate students are concerned about financial and administrative support issues such as insufficient tuition waivers and inadequate office space for these students. Reductions to departmental budgets could also hurt recruiting efforts as these budgets support that activity substantially. Graduate Studies will implement an internal graduate program review to evaluate all programs against selected criteria. This could lead to resource reallocation to promote quality graduate programs.

Other factors, both internal and external, impact graduate education. For example, an increasing number of math/science teachers requiring a master's degree helped promote the development and subsequent high enrollment in the Master of Science in Science Education program. The Master's of Professional Accountancy, Master of Architecture and Master of Science in Civil Engineering have shown strong enrollment and graduation numbers and represent a new growth area--students in pursuit of *professional* master's degrees.

Over the last five years, MSU has initiated new programs which have produced pronounced increases in graduate student applications, enrollment, and graduation rates. The Master of Science in Science Education, Master of Architecture, Master of Arts in English, Master of Arts in Native American Studies, Master of Professional Accountancy, and the Master of Project Engineering and Management have all been successful by these measures. Revised programs of study in the M.S. in Civil Engineering [with a professional degree focus on structures] and an administrative/advisor process that entails advanced advising and mentoring techniques have caused growth in this program.

This Fall, another new program will be implemented. The Master of Fine Arts in Science and Natural History Filmmaking had 21 slots for graduate students, all of which were filled almost immediately. The program is supported by *DiscoveryCommunications, Inc.* at \$1.37 million for 7 years.

Distance education and extended degree programs have played a significant role in increased master's enrollments. The recently approved option in Health and Human Development-Family Financial Planning will make MSU's graduate education and distance learning role visible on a national level as it involves a consortium of mid-western and western universities. This entirely distance master's program will induce students to enroll who otherwise would or could not attend MSU.

## Doctoral Degrees

Doctoral degree production at Montana State University-Bozeman has declined recently, but efforts are underway to rectify the situation. Graduate Studies is considering ways to offer incentives for faculty and departments to increase master's and doctoral enrollments in funded research programs. This would give students increased laboratory experiences while supporting post-doctoral scholars in a mentoring relationship that could broaden their post-doc experience. This proposal ties MSU's research programs to its educational mission and should increase overall graduate enrollment and productivity.

Over the last decade MSU-Bozeman averaged 43 doctorates degrees per year. MSU granted 33 Ph.D. and Ed.D. degrees in Spring 2001 and had a high of 66 doctorates granted in 1997. Insufficient tuition waivers affect doctoral students, although not as much as master's candidates. Doctoral students are more likely to be supported by research grants rather than state dollars.

MSU now offers students an outstanding doctoral environment through the National Science Foundation-funded IGERT (Integrated Education and Research Training) program. This interdisciplinary program, entitled *Structural and Functional Analysis of Complex Biological Systems*, allows students to rotate through three different laboratory situations and work with different faculty during the first year, before they commit to working with a specific faculty member and department. The Cell Biology and Neuroscience Department oversees this early mentoring process to ensure student progress.

## Montana State University-Billings

Dr. George T. White, Director of Graduate Studies & Research, responded for MSU-Billings. He reports that the enrollment in graduate programs has grown steadily the last few years (96-97, 358 FTE; 97-98, 350 FTE; 98-99, 468 FTE; 99-00, 535 FTE; 00-01; 600 FTE). There have been many changes in graduate program offerings, which have contributed to the increase in enrollment.

The College of Business began offering a Master of Science in Information Processing and Communication in 1995. The MSIPC has not yet reached its fullest potential. The College of Professional Studies and Lifelong Learning began offering a Master's of Health Administration in 1997. This program has shown steady growth with each cohort being fully subscribed. The degree is offered on campus and at a number of sites within the state.

The Department of Health and Physical Education in the College of Education and Human Services began offering a Master of Science in Sport Management in 1999. The degree will be offered completely online beginning Fall 2001. This program has grown steadily and is nearly fully subscribed. Overall, enrollments in the College of Education and Human Services have been stable over the period under review. A slight enrollment decline has been turned around. Two popular new programs are drawing new students: a post-baccalaureate Teacher Certification Program and the Master of Education, Interdisciplinary Studies option with Teacher Certification.

The College of Arts and Sciences offered two new degrees in Fall 2000: Masters of Science in Public Relations and in Psychology. Both of these programs filled to capacity the first year.

### Montana State University-Northern

Dr. Darlene Sellers, Dean of Education and Graduate Studies, responded to the inquiry on behalf of MSU-Northern. The narrative addresses major events experienced in the graduate programs between 1989-90 and 1999-00.

Counselor education. Prior to 1994, the counseling program required 36-semester credit hours. Because of the clinical nature of counseling programs, faculty increased program requirements to 48 credit hours. This change in credit hours caused a significant enrollment loss. In addition, changes in certification and accreditation requirements for practica and internships required a smaller student-faculty ratio (5:1) in those courses. Budget constraints precluded creating a new position that would allow the program to admit more than 10-15 students per year.

Elementary education. Elementary education maintained steady enrollment until the Master's of Science in Learning and Development was implemented in 1995-96. This new master's broadened the options for both secondary and elementary teachers who were seeking an education practitioner's degree. Thus, enrollment in the elementary education program dropped significantly and has leveled out to about 5-7 graduates per year.

Learning and development. Listed as "secondary education" on the data sheet, the Learning and Development master's degree stresses curriculum development to enhance K-12 student achievement. This new master's was developed to attract elementary through secondary teachers who are interested in developing their skills and increasing their knowledge as a master teacher.

Technical education. The steady decline in enrollment may be attributed to a diminished demand for this degree at a master's level within the state. In 1999-00, the college terminated this degree option with the intent of rejuvenating the program to meet the needs of the state's work force by focusing on adult training and development. MSU-Northern's Level II proposal was not supported by the MSU-Bozeman campus and, therefore, was not submitted to the Board.

General science. There appear to be classification errors for this degree within the CIP's report. The degree has consistently graduated 4 to 6 students per year. MSU-N will consult with OCHE to rectify the apparent error.

### The University of Montana-Missoula

#### Master's Degrees

Dr. David Strobel, Dean of the Graduate School at The University of Montana-Missoula, reported that changes over the past decade were (a) in response to program review in 1995, (b) results of an institutional strategic plan developed in 1998, and (c) consequences of market and resource changes.

At the master's level, the M.S. in Physics was discontinued because enrollment and graduation rates were below minimum, and the cost to increase productivity was prohibitive. M.A. and M.F.A. programs in Drama/Dance, Art, and Music were consolidated into two degrees in Fine Arts. The M.A. degrees in Spanish, German, and French were combined into a single M.A. degree in Foreign Languages and literatures for savings and efficiency. Recently, the campus placed a moratorium on the environmental philosophy option because of the loss of a faculty line.

As a result of program review, Anthropology significantly increased enrollment, particularly in its cultural anthropology option, resulting in an eight-fold increase in the number of graduates. The M.A. in Economics will be reviewed by the Graduate Council to assess its viability. The M.A. in Philosophy, which had undergone previous review, is showing a significant recovery with the introduction of its new option in ethics and the establishment of the Practical Ethics Center.

Master's-level programs that have grown and flourished over the decade include environmental studies, the MBA program in business, and the M.F.A. in Creative Writing. Introduction of additional distance learning sites for the M.B.A. has provided accessibility and convenience to students. The newly approved M.S.W. should address a strong demand for graduate training in social work.

Moving the physical therapy program from an undergraduate degree to a master's degree with super tuition has increased the quality of the training for the students and has resulted in a graduation rate close to 100 percent. A new doctorate in physical therapy, approved at the May Board meeting, will address the evolving needs of the profession. Their application pool showed a reduction this year, but it did not affect the size of their admitted cohort. It should be noted that the Pharm.D. is a successful new program in Health Sciences. School psychology moved from an M.A. to an Educational Specialist degree program.

Education showed a decline in graduate productivity during the middle of the decade. The School of Education subsequently reorganized into two departments: Educational Leadership & Counselor Education and Curriculum & Instruction. Educational Leadership focused on increasing doctoral productivity by establishing a cohort model, and both departments increased evening and distance learning offerings. Graduation rates in both departments have increased.

### **Doctoral Degrees**

In 1996, Doctoral programs were encouraged to increase their enrollments and graduation rates. Doctoral graduates increased from 27 in 1996 to 46 in 1997.

Educational Leadership developed a structure that admits groups of students to move through the doctoral program as a cohort (taking courses, comprehensive exams, and preparing their dissertations together). Peer pressure/assistance tends to maintain progress and very few students drop out. Educational Leadership is currently starting its fourth cohort and a second cohort of doctoral students from Taiwan. In addition, Counselor Education has formed a doctoral cohort in Browning and currently is establishing a cohort at Salish-Kootenai College.

Forestry's doctoral enrollment has steadily increased since 1996. The new Ph.D. in Fish & Wildlife Biology has the potential for similar growth. The new Ph.D. in Pharmaceutical Sciences is also likely to grow with increases in its domestic pool of applicants. The doctoral programs in the Biological Sciences had graduate assistantship stipends that were sufficient to attract master's level students but were not competitive with peer institutions to attract doctoral students. Thus, enrollment of master's students increased while doctoral student enrollment declined. The Division of Biological Sciences increased their assistantship stipends and recruited all of their top tier doctoral applicants to reverse the enrollment trend.

Geology has experienced a similar increase in their master's student enrollment and decline in doctoral enrollment; this downturn is attributable to the job market, where there is currently a greater need for master's degree graduates than Ph.D.s. Mathematical Science's low doctoral enrollment is expected to change with reallocation of faculty lines to their Math Education option.

The Psychology Department's enrollment in their clinical doctoral program is limited by student/faculty ratios and accreditation standards, but the potential for growth in their developmental option has recently been enhanced by strategic faculty hires.

### **Future Trends**

Although fiscal challenges have resulted in faculty losses and made it difficult to maintain competitive levels in graduate stipends, the institution has partially addressed budgetary issues through increased grant funding and innovative reallocation strategies. The University of Montana's strategic plan calls for significant increases of graduate enrollment. In addition, the plan challenges the institution to meet the criteria for Carnegie classification as a Doctoral Extensive University by 2005 (50 doctoral graduates per year from 15 doctoral disciplines). Provost Muir recently established a Task Force on Graduate Education to investigate methods and procedures for meeting these goals.

### **Montana Tech of the University of Montana**

Dr. Joseph Figueira, Vice Chancellor for Research and Graduate Studies, reports that M.S. program production at Montana Tech has been steady over the last eleven years, with an average of 33 graduates per year. Overall, there is a small growth trend of slightly less than 2 percent per year, with annual variations of as much as 40 percent. The relatively steady productivity is surprising in light of a 500-percent increase in grant and contract activity during the same period and the corresponding increase in faculty scholarship and research. Several factors contribute to this anomaly.

### **Major Events**

1) Graduate students today are generally sought after and given many different forms of financial support. This has impacted Montana Tech's ability to recruit new graduate students. The details of degree production in each field illustrate the opportunities and challenges in today's recruiting market.

Environmental Engineering and Industrial Hygiene lead in degree production. The former has an active research faculty and operates in a supportive research funding environment. Industrial Hygiene has benefited from Federal workforce development grants to train students for needed positions in industry. Both programs can attract students with these competitive financial awards.

Programs with the lowest graduate degree production comprise the historical strengths of Montana Tech--mining, petroleum and metallurgical engineering. Corporate and federal support for students in these programs has dropped dramatically during the last ten years, so students are seeking other, better-funded educational opportunities. For example, the U.S. Bureau of Mines that provided nearly \$200,000 in scholarship money to the mining and metallurgy programs has been eliminated; and nearly all of the petroleum industry research in the last ten years has been outsourced to consulting firms and Ph.D.-granting institutions. Without a Ph.D. program, Montana Tech fails to qualify for these corporate petroleum research funds.

Finally, two new programs--Technical Communications and Project Engineering & Management--have generated strong student interest, especially among professionals returning for additional education. These programs were generated in response to changing employer needs or changing technological aspects of the market. Often, student employers provide tuition and offer work release time.

2) There is growing divergence between the cost of education and our ability to make competitive financial awards to students. The annual cost of non-resident graduate tuition and fees at Montana Tech has risen from \$4,688 in 1992 to \$10,326 for academic year 2001-2002, a 220-percent increase. At the same time, funding for fee waivers and teaching assistantships has remained constant. This situation changed in AY 1999-2000 and the campus expects the increased support over the next several years to permit academic departments to recruit aggressively and competitively.

3) External economic trends affect graduate enrollment. The strong and sustained economic boom of the 1990's provided very attractive employment opportunities for students graduating with a Bachelor of Science and encouraged many potential graduate students to postpone graduate education or leave Montana Tech before completing their degree requirements.

4) Changing faculty demographics have affected departments' ability to supervise an increased number of students. Faculty retirements, continual and unpredictable University system budget crises, and low salaries have resulted in faculty positions remaining unfilled for one or two terms, thus discouraging departments from planning for growth.

### **Forces Causing Program Elimination**

No programs have been eliminated during the period, but nine programs have been merged to address program review graduation productivity thresholds. Seven degree programs were merged into options within a new Geosciences degree program. This formally recognized the collaborative and supportive nature of these programs.

A second set of programs, Metallurgical Engineering and Mineral Processing Engineering were also merged, with two respective options. In both cases, many of the factors outline above affected student enrolment.

### **Circumstances Prompting New Programs**

Tech has introduced several new programs during the period. They show how forces can and should come together in the generation of new academic programs.

1) The Masters in Project Engineering and Management (MPEM), was developed in direct response to a Montana company's workforce retraining needs. Montana Tech and MSU formed a planning team and worked with the Montana company for a year to identify the required outcomes, to assemble or construct the relevant courses, and to design a remote delivery system to minimize student travel. The program successfully met the need of the original industrial partner and is now being expanded via the Internet to audiences throughout Montana and the U.S.

2) The collaborative Master's of Science in Technical Communications resulted from a faculty survey to identify needs of the broad communications market. Faculty designed a unique program to meet these needs. The M.S. is popular with recent B.S. graduates and returning professionals from several fields: communications, law and engineering. The program has one of the largest incoming graduate student classes.

3) Tech has created an accelerated Master's plan that allows motivated students of high academic standing to complete the requirements for the M.S. in one additional year beyond the B.S. Qualified students may be granted provisional admission to the Montana Tech Graduate School which makes them eligible to take graduate-level classes in their junior and senior years and begin thesis research through the undergraduate research program. This "Fifth Year M.S. Program" was initiated in 1999. To date, students have shown only mild interest, probably due to some of the same external forces described above.

### **The University of Montana-Western**

In January 1987, the Board of Regents of the Montana University System decided to discontinue the Master of Education degree program at Western Montana College, effective Fall 1990. Students who started the program prior to that decision were allowed to complete the degree. No new students were admitted to graduate study at Western after the decision to discontinue was made.

This study will continue with further collection of data and general information about graduate education on the national scene. A final, comprehensive report to the Board of Regents should be completed in the Fall.

pc: Commissioner Crofts  
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