

MONTANA UNIVERSITY SYSTEM NEW ACADEMIC PROGRAM PROPOSAL SUMMARY**Campus: Montana State University-Bozeman****Program Title: Doctor of Philosophy Degree in Earth Sciences****1. How does this program advance the campus' academic mission and fit priorities?**

The proposed Doctor of Philosophy in Earth Sciences degree program will provide students a challenging graduate education through curricular and research experiences that are multi-disciplinary, collaborative, and integrative. Graduates will possess the communication skills necessary to share their new knowledge of the natural resources and environment of Montana and the region to the citizenry in a variety of forums that convey its relevance to the lives of Montanans and communities in which they live. This program will also serve the University's strategic priorities of expanding the graduate student population and enhancing recruitment of new students.

2. How does this program fit the Board of Regents' goals and objectives?

Given the strong geographic, faculty, and institutional resources already available at MSU-Bozeman in Earth Sciences (geology, paleontology, geography), this program will provide an exciting and synergistic environment for graduate student learning and achievement. With areas of emphasis in geographic information science, snow and avalanche science, earth surface systems, paleontology, geobiology, and geoscience education, this program will provide graduate students across the country with access to opportunities and resources to expand their knowledge and skills in areas of inquiry not readily available at other institutions. As such, the reputation of Montana State University-Bozeman as a national and international institutional leader in an earth systems approach to understanding natural resources will be greatly enhanced. Given the expanding interest nationwide in these areas of knowledge in the earth sciences, this program is well positioned to attract a stable, sustaining cohort of doctoral students who will make significant contributions to the understanding of the resource base of not only Montana, but also the Northern Rocky Mountain region and beyond.

3. How does this program support or advance Montana's needs and interests?

Overall, this program will make important contribution to understanding Montana's natural resources and their significance to the citizenry. This enhancement of our knowledge of the earth system will be facilitated by the research conducted by doctoral students during their academic training, and also beyond graduation as they apply their expertise and skills as professionals. More specifically, advanced learning in geographic information science will contribute enhanced skills to the public and private sectors in natural resource data management and environmental modeling. Paleontologic research will advance our understanding of Montana's rich fossil resource heritage. Investigation in snow and avalanche science will provide better predictive capabilities in assessing avalanche hazards to the public and hydrologic resources. Inquiry in geobiology will lead to advances in environmental pollutant remediation, as well as the diversity of life in extreme environments and its potential applications to society. Knowledge of earth surface systems will produce better knowledge of the abundance of and controls on resource formation (coal, hydrocarbons, water), earthquake and volcano hazards to the public, and environmental consequences of resource development. Research in geoscience education will provide improved ways of communicating information about the earth and its resources to the public in the classroom and through the electronic and print media at a variety of levels of understanding.

4. How will this program contribute to economic development in Montana?

It is difficult to quantify the direct economic contribution this program will have for Montana or the region. However, given that the program will produce graduate students who's research and learning are focused on the geological, paleontological, and geographic resources of Montana and the Northern Rocky Mountain region in emphasis areas relevant to this region, it can be inferred that a considerable economic

impact could emerge. For example, increasing the knowledge base and number of students with expertise in geographic information science and systems will undoubtedly improve the training of persons in this expanding field of employment across the state. Improved understanding of paleontologic resources and new discoveries at MSU have already led to an increased tourist base for persons interested in seeing its fossil resources both in the field and at the Museum of the Rockies. Research in geobiology has the potential for development of novel microbial solutions to environmental problems. New knowledge in avalanche forecasting and spring run off prediction has importance for ski area development and water resource utilization, respectively. Improved understanding of energy resource distribution and new methods of exploitation (coal-bed methane) has the potential to contribute to resource development in an environmentally sensitive way. Understanding the seismic hazards of Montana has the potential to save lives. Knowledge about climate change could be extremely beneficial to the future of agriculture.

5. What is the Program's planned capacity? 15-20 FTE students

Break-even point? 5 FTE students

Enrollments/year? 2-3 new FTE students MT jobs/year? 1-2

6. Resource Allocation

Total program budget? \$130,000 (not including faculty/staff salaries)

Faculty FTE? 15 Staff FTE? 4

Does this program require new resources? Amount? \$300,000

This program will require funding for several new GRAs/GTAs per year, with an estimated pro-rated cost of approximately \$130,000 by Year 3 of the program. In addition, 3 FTE faculty positions (molecular paleontology, biogeography/climatology, geobiology) are also necessary to fund the program. Total salary estimate for these positions is approximately \$170,000.

How will the campus fund the program?

The College of Letters and Science will provide all salary funding for the 3 faculty positions through reallocation of faculty lines and filling of vacant lines created by retirement (approximately \$170,000). Accompanying start-up costs for these positions will be provided through College, VP Research, and Department Indirect Costs.

Funding for GRA/GTA support for graduate students will be accomplished through re-allocation of allocated GTA funds in the Department of Earth Sciences, and from support for GRAs from faculty research grants. The total projected 3-year cost of approximately \$130,000 for GRA/GTA support will be covered by these sources of funds.