

LEVEL II BOARD OF REGENTS ITEMS

CURRICULUM PROPOSALS

1. Overview
Proposal to move from the current BA: Mathematics Option and Five Related Areas (Sub-Options) to a B.S. Major with three options.
2. Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.
The Mathematics Department proposes to consolidate all of its program offerings into a single B.S. Major in Mathematics. This single B.S. Major in Mathematics would continue to allow students the flexibility to pursue their dreams of graduate study, careers in applied mathematical fields and careers in Secondary Education through options and combined majors. This single, streamlined major may be used in three different modes. First, students may take the major by itself without any additional minors, majors or options. Students following this track are expected to complete a thesis in mathematics once they have completed the bulk of their coursework. This may be thought of as a “liberal arts” track that leaves students with plenty of room for taking electives from a broad range of disciplines. Second, students may choose to complete one of three proposed options in Mathematical Biology, Mathematical Ecology, or Mathematical Geology. Students following this track are also expected to complete a thesis. Finally, students may elect to complete a double major in Mathematics and Secondary Education. Students completing double major with Secondary Education will not be expected to complete a thesis. Instead, they will complete a semester of student teaching.
3. Need
 - a. To what specific need is the institution responding in developing the proposed program?
Currently, the bewildering array of program offerings at Montana Western make it difficult for students who are interested in a career in mathematics to chart a course that gives them the flexibility they need in today’s job market. Consolidating all these separate programs into a single focused major will give students the flexibility to pursue career in applied mathematics, mathematics education, or head to graduate school to pursue an advanced degree. In addition, because the present system of program offerings is not well understood (B.A. Arts, Mathematics Option, etc.) a single B.S. Major in Mathematics will provide our students with the single Major they need to be maximally effective in the job market
 - b. How will students and any other affected constituencies be served by the proposed program?
In a very general sense, students who are currently enrolled in one of the existing mathematics programs at UMW would benefit from the new degree structure in that they will have the opportunity to pursue a recognizable B.S. Major in Mathematics that was not available to them at UMW before. In addition the fact that the new degree structure is streamlined (one common core for all sub-disciplines, fewer options, etc.) students can expect to benefit from a more efficient scheduling of course offerings.

There are also several specific ways in which students will benefit from the proposed Major. Students who are pursuing of the Environmental Science or Biology Majors offered at UMW would also benefit from the proposed Math degree and its options. The options in

Mathematical Geology, Mathematical Biology, and Mathematical Ecology will inject students with a higher level of mathematical ability into many of the core courses offered by Environmental Science and Biology. This has the potential to enhance the experience of all students enrolled in those classes; mathematics students will be able to work side by side with science students in an experiential setting that simulates an interdisciplinary research group.

Students who plan to pursue a career in mathematics education will be enrolled in the same core classes as their peers who are following the other avenues the proposed degree offers. This will benefit the mathematics education students because it will provide them with exposure to and experience with what are likely to be practicing mathematicians. The importance of this can't be stressed enough given today's demand for highly quality mathematics teachers in the secondary education system.

There is one final category of student who will benefit from the proposed degree. In the past, there was no home at UMW for the student who wanted to simply pursue a liberal arts mathematics degree and supplement it with a full array of electives of their choosing. This is now available to the student who elects to enroll in the core Major but pursue neither a double major in secondary education or one of three options in Mathematical Geology, Biology or Ecology.

- c. What is the anticipated demand for the program? How was this determined?

The proposed B.S. Major in Mathematics will serve all of the existing students without requiring any additional work or credit hours than what is required of them in their current degree programs. There are approximately 30 to 40 students who are currently pursuing one of the mathematically oriented degree programs now offered. These students were identified by polling academic advisors who are responsible for mathematics students. While none of these current students will be required to switch to the new structure, it is anticipated that most will want to do so.

4. Institutional and System Fit

- a. What is the connection between the proposed program and existing programs at the institution?
As already stated, a B.A. with an Option in Mathematics and Related Areas in Geology, Physics, Biology, Ecology, or Pure Mathematics, and a B.S. Secondary Education Major with a "Major" (Option) in Mathematics are currently offered at The University of Montana Western. The proposed B.S. Major in Mathematics is planned to replace these existing programs using the following protocols:

(1) Students who are currently enrolled in the B.A. Mathematics Option with Related Areas in Geology, Ecology, or Biology will be able to pursue the B.S. Mathematics Major with Options in Geology, Ecology, or Biology. It will be possible for students to complete the combination of the Major and one of these Options in 120 credits.

(2) Students who are currently enrolled in the B.A. Mathematics Option with Related Areas in Physics or Pure Mathematics could elect to take the B.S. Mathematics Major by itself and then use their elective credits to take additional credits in Physics or Pure Mathematics. In fact, such students may use their elective credits however they wish (e.g. to pursue interests outside of the mathematical sciences). This option was not available prior to the proposed B.S. Mathematics Major. It is possible for students to complete this plan in 120 credits.

(3) Students who are currently enrolled in the B.S. Secondary Education Major with an Option in Mathematics would be able to enroll in a double major using the proposed B.S. Mathematics and a standalone B.S. Secondary Education major that is offered by the Education Department at

the University of Montana Western. It will still be possible for these students to finish both majors in 128 credits.

- b. Will approval of the proposed program require changes to any existing programs at the institution? If so, please describe.

These proposals have been the product of long-term collaboration and negotiation with the UMW Education Department to better serve the need of students seeking certification in Mathematics. Students under the proposed changes would double major in a content field plus Secondary Education, thus being "Highly Qualified Teachers" at graduation under NCLB rules.

- c. Describe what differentiates this program from other, closely related programs at the institution (if appropriate).

N/A

- d. How does the proposed program serve to advance the strategic goals of the institution?

The proposed degree helps address strategic goals I and II: Increase educational attainment of Montanans and assist in the expansion and improvement of the economy. Graduates of the proposed B.S. Mathematics degree will either be well prepared for a career in 5-12 mathematics education or for advanced study and research in the mathematical sciences. It is now common knowledge that there exists a high demand for mathematics teachers both in Montana and across the US. However, in a broader sense, the demand for general purpose mathematicians is projected to grow during the next decade. A recent article in the Wall Street Journal predicts that the employment of mathematicians and statisticians is to increase by 22 percent and 13 percent (respectively) over the 2008-2018 decade. A streamlined, transparent, and flexible B.S. degree structure for Mathematics will both attract new students and better serve our existing students to meet these needs.

- e. Describe the relationship between the proposed program and any similar programs within the Montana University System. In cases of substantial duplication, explain the need for the proposed program at an additional institution. Describe any efforts that were made to collaborate with these similar programs; and if no efforts were made, explain why. If articulation or transfer agreements have been developed for the substantially duplicated programs, please include the agreement(s) as part of the documentation.

The University of Montana Western is the only public university that offers a mathematics degree under Experience One block scheduling. This allows Montana Western to offer its curriculum in an experiential format that allows majors to work together in small classes and participate in focused projects that support the learning and authentic practice of mathematics. For instance, by the time our students graduate, they will have had the opportunity to participate in activities such as an undergraduate research symposium, both the review and creation of scientific journal articles in modeling classes, the evaluation of potential dam designs in calculus classes, etc.

5. Program Details

- a. Provide a detailed description of the proposed curriculum. Where possible, present the information in the form intended to appear in the catalog or other publications. NOTE: In the case of two-year degree programs and certificates of applied science, the curriculum should include enough detail to determine if the characteristics set out in Regents' Policy 301.12 have been met.

Please see the attached UMW curriculum proposal.

- b. Describe the planned implementation of the proposed program, including estimates of numbers of students at each stage.

It is anticipated that the implementation of the proposed major will have an immediate, beneficial effect on our existing 30 to 40 Mathematics students. Since the proposed major is a

repackaging of our existing programs, no new coursework is required of new students that isn't already required of existing students. Therefore, the existing students will be able to convert to the new, more transparent major with no need to enroll in additional credits. No transitional period will be required for migrating from the old major structure to the proposed one. Again, this is because the proposed major is a simple repackaging of the existing math programs. Therefore, it is proposed that the old B.A. Option in Mathematics and its five Related Areas be closed to further enrollment by the Fall of 2011.

6. Resources

- a. Will additional faculty resources be required to implement this program? If yes, please describe the need and indicate the plan for meeting this need.

No new personnel resources will be required for the implementation of this proposal. The programs described in this proposal exist and are being replaced by the proposed degree. In fact, two programs (the related areas in physics and pure math) are being eliminated. In practice, this proposal is not creating any new classes or programs. It is simply repackaging existing programs into a more flexible B.S. structure.

- b. Are other, additional resources required to ensure the success of the proposed program? If yes, please describe the need and indicate the plan for meeting this need.

No new resources of any other nature will be required for the implementation of this proposal. The programs described in this proposal exist and are being replaced by the proposed degree. In fact, two programs (the related areas in physics and pure math) are being eliminated. In practice, this proposal is not creating any new classes or programs. It is simply repackaging existing programs into a more flexible B.S. structure.

7. Assessment

How will the success of the program be measured?

Assessment will be conducted in accordance with the current established procedures used by the Mathematics Department under the NWCCU and NCATE accreditation bodies. These procedures are compatible and appropriate both for our existing mathematics programs and the proposed one. Moreover, in 2006, during our academic program review, our external reviewer recommended that we consolidate our existing programs into a standalone major. Therefore, the proposed change is consistent with the findings of our assessment and accreditation cycles and current long term goals.

8. Process Leading to Submission

Describe the process of developing and approving the proposed program. Indicate, where appropriate, involvement by faculty, students, community members, potential employers, accrediting agencies, etc.

The proposed program changes were developed through direct collaboration between the between the faculty of the UMW Departments of Mathematics, Education, Environmental Sciences, and Biology. In addition, it has passed through an extensive curriculum review process on campus in which it was scrutinized by our Curriculum Committee, our General Education Committee, all of our Department Chairs, the Faculty Senate (which includes representatives from our Student Senate), and our Provost and Chancellor. Finally in 2008 the national (NCATE) and state standards for accreditation of mathematics education programs were reviewed. The Mathematics Education program was reviewed and re-approved by the state.