

## LEVEL II MEMORANDUM

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**DATE:** June 29, 2012

**TO:** Chief Academic Officers, Montana University System

**FROM:** Sylvia Moore, Deputy Commissioner for Academic, Research, & Student Affairs  
John Cech, Deputy Commissioner for Two-Year & Community College Education

**RE:** Level II Submission Items

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The campuses of the Montana University System have proposed new academic programs or changes under the Level II approval process authorized by the Montana Board of Regents. The Level II proposals are being sent to you for your review and approval. If you have concerns about a particular proposal, you should share those concerns with your colleagues at that institution and try to come to some understanding. If you cannot resolve your concerns, you need to raise those concerns at the Chief Academic Officer's conference call on **July 3, 2012**. Issues not resolved at that meeting should be submitted in writing to OCHE by noon on **Friday, July 6**. That notification should be directed to Summer Marston, Assistant to the Deputy Commissioners. If Summer does not hear from you, in writing, by noon on July 5, OCHE will assume that the proposals have your approval.

**The Level II submissions are as follows:**

**Montana State University-Bozeman:**

- Doctor of Nursing Practice [ITEM # 156-2001-C0812](#) | [Request Form](#) | [Curriculum Proposal](#)
- Latin American and Latino Studies Option [ITEM #156-2002-C0812](#) | [Request Form](#) | [Curriculum Proposal](#)
- Minor in Materials [ITEM #156-2003-C0812](#) | [Request Form](#) | [Curriculum Proposal](#)

August 6, 2012

**ITEM 156-2001-C0812**  
**Doctor of Nursing Practice**

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**THAT**

The Board of Regents of Higher Education authorizes Montana State University-Bozeman to establish a Doctor of Nursing Practice degree.

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**EXPLANATION**

Montana State University-Bozeman requests approval to offer a Doctor of Nursing Practice (DNP) degree. Students who have a baccalaureate degree in nursing or a master's degree in nursing will be eligible for admittance to this program. This new program is congruent with the recommendation of the American Association of Colleges of Nursing (AACN) who voted in 2004 to support moving the current level of preparation necessary for advanced practice nurses (nurse practitioners, midwives, clinical nurse specialists, and certified nurse anesthetists) from the master's degree to the doctorate by the year 2015. The College of Nursing currently offers three master's degree options, two of which are for advanced practice nurses (Family Nurse Practitioner and Family Psychiatric Mental Health Nurse Practitioner). The college is proposing to no longer offer the two nurse practitioner options at the master's level; these options will be moved to the doctoral level. The DNP degree is one of two terminal degrees currently offered by the profession of nursing with the other being the PhD. The DNP is a practice-focused degree and prepares experts in advanced clinical practice while the PhD is a research-focused degree designed to prepare nurse scientists and scholars. Currently, the College of Nursing offers no doctoral degree.

The DNP program will meet the needs of baccalaureate and master's prepared nurses who seek to earn a degree on par with the recommendation of the national organization. They will not have to leave the state to earn the degree that is becoming the standard for advanced preparation of nurses.

Consumers will be well served by graduates of this program in that the DNP prepared nurse is an excellent fit for a rural state such as Montana. With approval of this degree, MSU-Bozeman will begin preparing and graduating nurses with a clinical doctorate. Simultaneously, Montana's citizens will begin to receive care from highly skilled doctorally prepared professional nurses who can provide quality, primary care for children, adults, and the elderly. Additionally nurses with a DNP degree will have skills in the areas of organization and systems leadership, clinical scholarship, information systems/technology and patient care technology, health care policy, interprofessional collaboration, clinical prevention and population health. These additional competencies will result in highly educated practitioners who will not only provide expert direct primary care, but also will be leaders in the improvement and transformation of health care – both of which are desperately needed in Montana's rural remote areas.

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**ATTACHMENTS**

Level II Request Form  
Curriculum Proposal

**Montana Board of Regents**  
**LEVEL II REQUEST FORM**

Item Number: 156-2001-C0812 Meeting Date: August 6, 2012  
Institution: Montana State University – Bozeman CIP Code: 51.3818  
Program Title: Doctor of Nursing Practice

Level II proposals require approval by the Board of Regents.

**Level II action requested (place an X for all that apply and submit with completed Curriculum Proposals Form):**

Level II proposals entail substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other campuses within the Montana University System and community colleges. Board policy 303.1 indicates the curricular proposals in this category:

- 1. Change names of degrees (e.g. from B.A. to B.F.A.)
- 2. Implement a new minor or certificate where there is no major or no option in a major;
- 3. Establish new degrees and add majors to existing degrees; and
- 4. Any other changes in governance and organization as described in Board of Regents' Policy 218, such as formation, elimination or consolidation of a college, division, school, department, institute, bureau, center, station, laboratory, or similar unit.

**Specify Request:**

Montana State University requests approval to establish a Doctor of Nursing Practice (DNP) degree. This new program is congruent with the recommendation of the American Association of Colleges of Nursing (AACN) who voted in 2004 to support moving the current level of preparation necessary for advanced practice nurses (nurse practitioners, midwives, clinical nurse specialists, and certified nurse anesthetists) from the master's degree to the doctorate by the year 2015. If the DNP is approved, the nurse practitioner options at the master's level will be eliminated.

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**CURRICULUM PROPOSALS**

**1. Overview**

The College of Nursing at Montana State University-Bozeman is seeking approval to offer a Doctor of Nursing Practice (DNP) degree. Students who have a baccalaureate degree in nursing or a master's degree in nursing will be eligible for admittance to this program. This new program is congruent with the recommendation of the American Association of Colleges of Nursing (AACN) who voted in 2004 to support moving the current level of preparation necessary for advanced practice nurses (nurse practitioners, midwives, clinical nurse specialists, and certified nurse anesthetists) from the master's degree to the doctorate by the year 2015. The College of Nursing currently offers three master's degree options, two of which are for advanced practice nurses (Family Nurse Practitioner and Family Psychiatric Mental Health Nurse Practitioner). The college is proposing to no longer offer the two nurse practitioner options at the master's level; these options will be moved to the doctoral level. The DNP degree is one of two terminal degrees currently offered by the profession of nursing with the other being the PhD. The DNP is a practice-focused degree and prepares experts in advanced clinical practice while the PhD is a research-focused degree designed to prepare nurse scientists and scholars. Currently, the College of Nursing offers no doctoral degree.

**2. Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.**

The Doctor of Nursing Practice (DNP) will target students who have a baccalaureate degree in nursing or a master's degree in nursing. The DNP degree is one of two terminal degrees currently offered by the profession of nursing with the other being the PhD. The DNP is a practice-focused degree and prepares experts in advanced clinical practice while the PhD is a research-focused degree designed to prepare nurse scientists and scholars. Currently, the College of Nursing offers no doctoral degree.

**3. Need**

**A. To what specific need is the institution responding in developing the proposed program?**

Besides AACN's decision in 2004 to adopt the goal that preparation for advanced practice nurses should occur at the doctoral level, other societal, scientific, and professional developments are stimulating this shift in graduate nursing education. The changing demands of the nation's complex healthcare environment require the highest level of scientific knowledge and practice expertise to assure quality patient outcomes. The Institute of Medicine, the Joint Commission for the Accreditation of Health Care Organizations, and the Robert Wood Johnson Foundation have called for reconceptualizing educational programs that prepare today's health professionals, including nurses. Some of the many factors building momentum for change in nursing education at the graduate level include: the rapid expansion of knowledge underlying practice; the complexity of patients' illnesses and the high level of skill that is required of caregivers; national concerns about the quality of care and patient safety; shortages of nursing personnel that demand a higher level of preparation for leaders who can design and assess care; and shortages of doctorally-prepared nursing faculty. In a 2005 report titled *Advancing the Nation's Health Needs: NIH Research Training Programs*, the National Research Council called for the nursing profession to develop a non-research clinical doctorate to prepare expert practitioners who can also serve as clinical faculty. AACN's work to advance the DNP is consistent with these calls to action and societal changes. Nursing is moving in the direction of other

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health professions as it transitions to the DNP. Medicine (MD), Dentistry (DDS), Pharmacy (PharmD), Psychology (PsyD), Physical Therapy (DPT), and Audiology (AudD) all offer practice doctorates.

**B. How will students and any other affected constituencies be served by the proposed program?**

The DNP program will meet the needs of baccalaureate and master's prepared nurses who seek to earn a degree on par with the recommendation of the national organization. They will not have to leave the state to earn the degree that is becoming the standard for advanced preparation of nurses. There are currently 37 states plus the District of Columbia that have schools that offer the DNP degree (or will beginning fall 2012) including six states surrounding Montana (CO, ND, OR, SD, UT, and WA). One hundred fifty-three DNP programs are currently enrolling students at schools of nursing nationwide, and an additional 160 DNP programs are in the planning stage.

Consumers will be well served by graduates of this program in that the DNP prepared nurse is an excellent fit for a rural state such as Montana. With approval of this degree, MSU-Bozeman will begin preparing and graduating nurses with a clinical doctorate. Simultaneously, Montana's citizens will begin to receive care from highly skilled doctorally prepared professional nurses who can provide quality, primary care for children, adults, and the elderly. Additionally nurses with a DNP degree will have skills in the areas of organization and systems leadership, clinical scholarship, information systems/technology and patient care technology, health care policy, interprofessional collaboration, clinical prevention and population health. These additional competencies will result in highly educated practitioners who will not only provide expert direct primary care, but also will be leaders in the improvement and transformation of health care – both of which are desperately needed in Montana's rural remote areas.

**C. What is the anticipated demand for the program? How was this determined?**

The College of Nursing posted an online interest survey beginning in June 2011 and also randomly selected 200 nurses to receive a postcard inviting them to complete the survey. To date, 54 nurses have responded with 47 (87%) stating they are interested in pursuing a Doctor of Nursing Practice degree. Thirty of those 47 (63.8%) responded they would like to start within 1-2 years and 11 (23.4%) within 3-4 years. Twenty-three respondents voluntarily revealed their name and address to facilitate ongoing communication; 18 of those reside in Montana. Anecdotally, graduate program staff in the College have begun informing prospective students who contact the College with interest about the nurse practitioner options that the College is planning (if approved) to begin offering a DNP degree and no longer a master's nurse practitioner option. Those inquiring are generally positive and rarely express lack of interest.

**4. Institutional and System Fit**

**A. What is the connection between the proposed program and existing programs at the institution?**

The baccalaureate nursing program and master's nursing options currently offered by the MSU-Bozeman College of Nursing will provide a foundation for students entering the DNP program. As a result of the implementation of the DNP program, the two master's degree nurse practitioner options (Family Nurse Practitioner and Family Psychiatric Mental Health Nurse Practitioner) will no longer be offered by the College. The College of Nursing will follow the mandate of the American Association of

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Colleges of Nursing and prepare advanced practice nurses at the doctoral level by offering the DNP degree. The Clinical Nurse Leader master's degree option will continue to be offered as it is now.

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

The two nurse practitioner options offered in the College of Nursing will no longer be offered at the master's level. The preparation to become an advanced practice nurse will occur at the doctoral level and will lead to the DNP degree.

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

There are no other graduate nursing programs offered at any of the MSU campuses (Northern, Billings, or Great Falls). This will be the first doctoral degree in nursing offered in the state of Montana. The DNP curricula will expand the current scope of practice of advanced practice nurses (e.g. nurse practitioners) that are currently educated in the College. Students currently enrolled in the master's degree nurse practitioner options will be allowed to complete their course of study.

**D. How does the proposed program serve to advance the strategic goals of the institution?**

The Vision of MSU is: *"Montana State University will be the university of choice for those seeking a student-centered learning environment distinguished by innovation and discovery in a Rocky Mountain setting."* The proposed DNP program is student centered in that didactic courses will be delivered using distance technologies (e.g. Internet; videoconferencing) so students can remain in their home locale. Most students will be able to complete the clinical component of the curriculum in or near their hometowns depending on the availability of clinical resources and preceptors.

The program supports the Mission of MSU *"To serve the people and communities of Montana by sharing our expertise and collaborating with others to improve the lives and prosperity of Montanans."* The College of Nursing has graduated over 150 advanced practice nurses since the mid-1990's. The vast majority of these graduates have remained in the state to practice, many serving in rural remote areas that have little or no physician coverage. These new doctorally prepared advanced practice nurses will be even better prepared to meet the primary health care needs of the citizens of Montana.

The DNP program will advance the following "MSU Five Year Outlook – FY 09 to 14" goals:

**Curriculum:**

- *Goal: "MSU will have graduate programs that are nationally recognized for research and teaching"* - The DNP program will enhance the College's national reputation as a leader in nursing. As a result of a rigorous, quality curriculum, and excellent teaching, graduates will be prepared to be expert clinicians, to be leaders at the systems level, and to use evidence to make a difference in practice and patient outcomes.
- *Goal: "There will be increased opportunities for interdisciplinary courses and programs and encouragement of team teaching across all disciplinary boundaries"* - The non-clinical courses that focus, for example, on systems leadership, information

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management, and health policy lend themselves to interdisciplinary courses, collaboration, and team teaching. Efforts will be made to form partnerships with non-nurse faculty when teaching the DNP students.

Looking at the broader context, this program supports the MUS Strategic Plan - Goal 2, Objective 2.1.2 *"Increase degrees and certificates awarded in high-demand occupational fields."* Advanced practice nurses remain in high demand and will be even more so as the proportion of our population who are aged increases. That population is plagued with chronic illnesses and benefits greatly from the expertise offered by advanced practice nurses. The chronic illnesses that are associated with aging tend to be complicated. These complicated symptoms and the complex treatments that are necessary require the advanced expertise that a nurse who has earned a DNP can provide.

- 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 MSU-Bozeman College of Nursing offers the only graduate nursing education program in Montana, thus there is no relationship or duplication with other programs. Of the fifteen Western Interstate Commission for Higher Education (WICHE) schools, eleven offer DNP programs which again, speaks to the fact that the DNP is the new standard in advanced practice nursing education. The MSU program will most likely not draw students from those out-of-state programs in that the size of nursing programs is limited by clinical resources. The didactic portion of the MSU program will be on-line, but clinical experiences are generally completed in the state or in close proximity because of the need for clinical supervision by MSU faculty. Anecdotally, deans of other DNP programs in the area have shared with Dean Melland of the College of Nursing that applications are high and there are generally more applicants than there are slots in most if not all programs.

## **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.**

The DNP curricula will build on the curricula that nurses who have a baccalaureate or master's degree in nursing have completed. Because students will enter the program with different degrees (post-baccalaureate or post-master's) and experiences, the curriculum will be somewhat individualized based on courses completed prior to entering the DNP program, area of specialization, and previous clinical learning experiences. Regardless of the entry point, the DNP curriculum is designed with the requirement that all students attain the same DNP end-of-program competencies.

The curriculum for the DNP program is consistent with the AACN *Essentials of Doctoral Education for Advanced Nursing Practice*. Those essentials recommend that DNP curricula include the following content: 1) Scientific underpinnings for practice; 2) Organizational and systems leadership for quality improvement and systems thinking; 3) Clinical scholarship and analytical methods for evidence-based

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practice; 4) Information systems/technology and patient care technology for the improvement and transformation of health care; 5) Health care policy for advocacy in health care; 6) Interprofessional collaboration for improving patient and population health outcomes; 7) Clinical prevention and population health for improving the nation’s health; 8) Advanced nursing practice; and 9) Specialty focused competencies.

Education of the DNP is distinguished by completion of a project that demonstrates synthesis of the student’s work and lays the groundwork for future scholarship. The curriculum will require students to produce an academic product that links the use of evidence to improve either practice or patient outcomes. This final DNP project will be defended by the student and reviewed and evaluated by an academic committee.

The proposed curriculum builds on the current Family Nurse Practitioner (FNP) and Family Psychiatric Mental Health Nurse Practitioner (FPMHNP) curricula. The curriculum for the DNP degree will require 79 credits versus 56-62 for the current nurse practitioner option master’s degree. Completion of the DNP degree will take three years of full-time study or longer if the students chooses a part-time approach. The 79 required credits will encompass both didactic and clinical requirements. The following table includes DNP courses, credits, and the AACN curriculum essential that each course fulfills.

| <b>DOCTOR OF NURSING PRACTICE COURSES</b>              | <b>CREDITS</b> | <b>AACN CURRCULUM ESSENTIAL</b> |
|--|----------------|---------------------------------|
| Advanced Health Assessment (*Core course)              | 3              | I                               |
| Advanced Pathophysiology (*Core course)                | 4              | I                               |
| Pharmacology (*Core course)                            | 2              | I                               |
| Advanced Pharmacology                                  | 4              | I                               |
| Legal and Ethical Issues In Health Care (*Core course) | 3              | V                               |
| Evidence Based Practice I (*Core course)               | 4              | III, IV                         |
| Evidence Based Practice II                             | 3              | III, IV                         |
| Differential Diagnosis                                 | 2              | I                               |
| Vulnerability and Health Care In Diverse Communities   | 3              | V                               |
| Advanced Practice Nursing Roles and Leadership         | 2              | II, V, VI                       |
| Translational Research Methods and Design              | 3              | III                             |
| DNP Scholarly Project Seminar                          | 2              | VII                             |



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|   |           |       |
|---|-----------|-------|
| DNP Scholarly Project   | 6         | VII   |
| Organizational Systems, Economics & Change                    | 4         | II,VI |
| Health Care Informatics                                       | 3         | IV    |
| Program Planning, Evaluation, Outcomes, & Quality Improvement | 3         | III   |
| Global Health   | 2         | VI    |
| FNP: Primary Care I – IV                                      | 26        | VIII  |
| FPMHNP: Family Mental Health Nursing I – IV                   |           |       |
| <b>Total DNP credits</b>                                      | <b>79</b> |       |

\* These courses would also be taught in the Clinical Nurse Leader master’s option.

The courses that DNP students enroll in will continue to be offered in much the same manner as the current nurse practitioner courses. The didactic courses will be offered using distance technology as is the current practice for all didactic courses offered in the Graduate Program. In order to meet course/clinical objectives and AACN standards for DNP curricula, students must complete 1,000 hours of precepted clinical learning experiences as opposed to the 500 hours required of master’s degree nurse practitioner students. Students will often complete these experiences in or near their home locale depending on availability of clinical resources and clinical preceptors. Students who have already earned a master’s degree as an advanced practice nurse (nurse practitioner) will receive some credit from their master’s clinical hours towards the required 1,000 minimum practice hours required in the DNP as well as theory credits from their master’s program.

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

If the program is approved, applications will be reviewed and admission decisions made for the DNP program in the spring of 2013 with students beginning studies in the fall semester 2013. In the past five years, the number of advanced practice (nurse practitioner) applicants has increased steadily from 37 applicants for admission in fall 2007 to 67 applicants for the fall 2011 admission; actual admission numbers have ranged from 20 – 30 per year, with that number being limited by the number of faculty and clinical capacity. Considering the interest survey and calls received from prospective students inquiring if the College is going to start a DNP program, it is reasonable to expect that the number of applicants will remain steady or continue to increase. It is anticipated that some DNP students will progress through the curriculum in three years and will graduate in the spring or summer of 2016. It is also anticipated that some students will select to progress on a part-time basis most likely because of additional time demands related to work or family and will graduate in spring of AY 2017-2018.

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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.**

At the present time, there is a full-time Dean, a full-time Associate Dean for Research and Graduate Education in Bozeman, and a full-time Campus Director (department head) on each of the MSU College of Nursing campuses (Bozeman, Billings, Great Falls, and Missoula/Kalispell). The Associate Dean provides administrative oversight of the graduate program and will continue to do so with the implementation of the DNP program. The faculty are committed to graduate education in the College and to the development of the DNP program. Forty-five of the 100 faculty in the College had some direct involvement with the education of graduate students (e.g. teaching classes, thesis advisement, admissions review) during the 2010-2011 academic year. Non-nurse faculty teach support courses such as pharmacology.

With the introduction of the DNP program, it will be necessary to recruit additional faculty who have the knowledge, skills, and abilities needed to teach the DNP students. As previously stated, there will be an additional 17-23 credits in the DNP curriculum required beyond the current nurse practitioner master's curriculum. We estimate the need for approximately 1.5 additional full-time equivalent (FTE), predominately tenure track, faculty. Many of the faculty in the College currently teach on a part-time basis, especially the nurse practitioner clinical faculty. It is anticipated that some of these faculty may choose to increase their workload to teach the DNP students.

**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.**

Since the DNP program will supplant rather than supplement the existing nurse practitioner options within the graduate program, the additional cost to deliver the DNP includes 17-23 more credits (credit variation due to differences in the different nurse practitioner specialty options), or a third year of instruction beyond the current master's. **The total estimated cost to deliver those additional credits (direct instructional costs only) is estimated to be approximately \$132,506 beginning AY 2015-16 when the DNP students register for the additional year of study not required of master's prepared nurse practitioner students.** This figure is based on direct instructional costs of \$98,153 (using an average tenure track salary within the College of \$65,435 x 1.5 FTE), plus \$34,353 in benefits (using a 35% estimated benefit rate).

On the revenue side, additional tuition dollars from student FTE's will be generated. The College admitted 28 nurse practitioner students in spring 2011 and 23 in spring 2010. If those numbers persist, or even drop slightly due to the offering of a new program, the tuition dollars generated would offset the additional program costs. Using the 2011/2012 MSU graduate resident tuition rates of \$6,092.40 (\$3,046.20/semester) and a net tuition yield of 95% (calculated for the College of Nursing, Fall 2011, based on tuition waivers provided), the following additional tuition dollars would be generated during the additional third year of the program:

| Number of Students | Additional Tuition Dollars Generated in 3 <sup>rd</sup> Year of Program |
|--------------------|---|
| 25                 | \$144,695   |

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|    |           |
|----|-----------|
| 30 | \$173,633 |
| 35 | \$202,572 |

As we move forward with this program, **we are requesting an additional \$100,000 be added to the College base dollars beginning in the 2015-16 academic year to support the additional faculty salaries needed for this program.** We believe this is justified based on the projected additional tuition revenue as shown above.

## 7. Assessment

### **How will the success of the program be measured?**

The DNP degree will be evaluated using the same criteria as all other academic programs in the College. The College has a Master Evaluation Plan (see Appendix A) which is formatted according to the four standards that must be met for ongoing national accreditation by the Commission on Collegiate Nursing Education (CCNE), the accreditation arm of AACN. The Evaluation Plan provides an infrastructure for identifying what data are to be collected, where to obtain the data, the responsible group/person for analyzing the data, a timeframe for data analysis, and the feedback loop to assure that data are used to make programmatic changes, as needed, or not – based on the evaluation process.

CCNE began accrediting DNP programs during the 2008-2009 academic year and has currently accredited 80+ DNP programs. Nursing programs are required to notify CCNE of any “substantive change” which includes a new degree offering. Notification must be submitted “no earlier than 90 days prior to implementation or occurrence of the change, but no later than 90 days after implementation or occurrence of the change” (CCNE; 2009; *Procedures for Accreditation of Baccalaureate and Graduate Degree Programs*). Thus, if approved, the College will notify CCNE of this proposal in summer 2013. The College will seek CCNE accreditation of its DNP program no earlier than one year after students first enroll, per CCNE policy, thus not before fall 2014.

## 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 development and offering of the DNP degree has been discussed extensively for several years in the College of Nursing among faculty and administrators at retreats, college meetings, and informal discussions. The College of Nursing 2005-2010 strategic plan states:

*Strategic Direction No. 3: Offer baccalaureate and graduate curricula that are consistent with national trends in professional nursing education.*

*3.2. Graduate education: Increase opportunity, flexibility and innovation with quality graduate education that may include:*

*iii. Converting existing APRN options from MN to DNP.*

The Graduate Academic Affairs Committee (GAAC) which includes faculty representation from each of the College campuses, the Associate Dean for Research and Graduate Education (non-voting), and student representation (non-voting) was actively involved in developing the curriculum for the DNP during both the 2009-2010 and 2010-2011 academic years. During the 2009-2010 academic year, the Associate Dean for Research and Graduate Education charged four task forces of faculty to develop a draft DNP curriculum

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based on the AACN *Essentials of Doctoral Education for Advanced Nursing Practice*. These task forces submitted curricular drafts to GAAC; these draft curricula provided a basis for further development of a curriculum that represents multiple faculty viewpoints and opinions and is consistent with national standards. Faculty have attended national conferences where the DNP was discussed and brought back recommendations to the faculty. The Dean of Graduate Education at MSU has been consulted and is supportive of this program based on the national recommendations and the needs in the state.

Board of Nursing approval is not required for this proposal as they do not regulate graduate education. The Executive Director of the Board of Nursing has been informed of the proposal to initiate a DNP program as a courtesy. This new program may require minor changes in the wording in the Board of Nursing Administrative Rules regarding licensure of advanced practice nurses. The Executive Director recommends the Dean of the College attend the Advanced Practice subcommittee of the Board of Nursing to discuss the need for rules changes. These changes will not need to be codified until the first class of DNP students graduate, which according to the proposed schedule, would be spring of 2016.

August 6, 2012

**ITEM 156-2002- C0812**  
**Latin American and Latino Studies Option**

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**THAT**

The Board of Regents of Higher Education authorizes Montana State University-Bozeman to establish a Latin American and Latino Studies Option

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**EXPLANATION**

Montana State University requests approval to establish a Latin American and Latino Studies (LALS) option within the Department of Modern Languages & Literatures. This new program will serve the interdisciplinary needs of a growing number of students who want to have a more holistic understanding of the region. Options such as LALS complement the knowledge of culture and language with courses from other disciplines that address the region from a different and focused perspective.

The LALS major option will couple the minor's multidisciplinary impulses to a wider set of globally-oriented and multicultural courses. The LALS minor will continue to exist for it serves a large number of students from majors such as Engineering, Film, and Architecture who have little flexibility in their schedules. The LALS major option aims to provide students with a multidisciplinary, international and multicultural program of study to better understand Latin American and Latino societies and cultures. The Latino Studies component of the curriculum in the new option is designed to educate students about the fastest growing minority group in the United States, including states like Montana. The LALS option will continue to enlist existing faculty resources and course offerings in the Department of Modern Languages & Literatures and the Department of Sociology & Anthropology.

The proposed option and curriculum responds to the ongoing desire for a diverse offering of multidisciplinary, international, and multicultural courses and the development of critical approaches for engaging the changing world.

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**ATTACHMENTS**

Level II Request Form  
Curriculum Proposal

**Montana Board of Regents**  
**LEVEL II REQUEST FORM**

Item Number: 156-2002-C0812 Meeting Date: August 6, 2012  
Institution: Montana State University – Bozeman CIP Code: 05.01107  
Program Title: Latin American and Latino Studies Option

Level II proposals require approval by the Board of Regents.

**Level II action requested (place an X for all that apply and submit with completed Curriculum Proposals Form):**

Level II proposals entail substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other campuses within the Montana University System and community colleges. Board policy 303.1 indicates the curricular proposals in this category:

- 1. Change names of degrees (e.g. from B.A. to B.F.A.)
- 2. Implement a new minor or certificate where there is no major or no option in a major;
- 3. Establish new degrees and add majors to existing degrees; and
- 4. Any other changes in governance and organization as described in Board of Regents' Policy 218, such as formation, elimination or consolidation of a college, division, school, department, institute, bureau, center, station, laboratory, or similar unit.

**Specify Request:**

Montana State University requests approval to establish a Latin American and Latino Studies (LALS) option within the Department of Modern Languages & Literatures. This new program will serve the interdisciplinary needs of a growing number of students who want to have a more holistic understanding of the region. Options such as LALS complement the knowledge of culture and language with courses from other disciplines that address the region from a different and focused perspective.

## Montana Board of Regents CURRICULUM PROPOSALS

### 1. Overview

The proposed Latin American and Latino Studies (LALS) option differs considerably from the Hispanic Studies (formerly known as Spanish) option. Hispanic Studies focuses on language proficiency and offers a broad survey of the cultures and societies of Spain and Latin America. The great majority of upper-division content courses are taught in Spanish and students need to have advanced language skills to take these classes. Hispanic Studies is thus a more traditional track. It is the equivalent of a B.A. in English in that the "Writing" option is our language acquisition component and the "Literature" option is our content courses. In recent decades, universities across the country and the rest of the world began offering majors like LALS (similar to the creation of American Studies) to serve the interdisciplinary needs of a growing number of students who wanted to have a more holistic understanding of the region. Options such as LALS complement the knowledge of culture and language with courses from other disciplines that address the region from a different and focused perspective. As a result, students in these options take most of their courses in English.

The LALS major option will couple the minor's multidisciplinary impulses to a wider set of globally-oriented and multicultural courses. The LALS minor will continue to exist for it serves a large number of students from majors such as Engineering, Film, and Architecture who have little flexibility in their schedules. The LALS major option aims to provide students with a multidisciplinary, international and multicultural program of study to better understand Latin American and Latino societies and cultures. The Latino Studies component of the curriculum in the new option is designed to educate students about the fastest growing minority group in the United States, including states like Montana. The LALS option will continue to enlist existing faculty resources and course offerings in the Department of Modern Languages & Literatures and the Department of Sociology & Anthropology.

### 2. Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.

Montana State University is proposing to expand their existing Latin American and Latino Studies minor into a Latin American and Latino Studies option within the Department of Modern Languages & Literatures. No additional resources will be needed to implement the program. The department grants a "Modern Languages and Literatures" degree with the choice of six major options: Hispanic Studies, French and Francophone Studies, and German Studies, Spanish K-12 Teaching, French K-12 Teaching, German K-12 Teaching. In addition, the Department of Modern Languages and Literatures currently offers six minors: Hispanic Studies, Latin American and Latino Studies, French, German, Japan Studies, Chinese Studies.

### 3. Need

#### A. To what specific need is the institution responding in developing the proposed program?

The proposed option and curriculum responds to the ongoing desire for a diverse offering of multidisciplinary, international, and multicultural courses and the development of critical approaches for engaging the changing world. Learning about Latin America through the lens of different fields such as Sociology, Spanish, or History enriches the students understanding of the region. In addition, students can participate in service-learning opportunities suited to their individual disciplinary interests (Engineering, Education, Counseling, Health Professions, etc.) through opportunities already in place in the major or by proposing a new one.

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Student response to the LALS minor has been strong. Informal data from advising students highlights the diversity of courses available and the contemporary perspectives on Latin American and Latino communities as important attractions to the minor. Spanish language development and the encouragement for travel in Latin America also rate high in student complements of the current minor. As a major option, students will be able to explore this program of study in much greater depth, and be better prepared to address the various changes impacting our own country while developing a more nuanced awareness of the political, economic, and cultural transformations affecting and linking us to our Latin American neighbors as well.

**B. How will students and any other affected constituencies be served by the proposed program?**

The Latin American and Latino Studies major will provide students with an in-depth program of study relevant to the contemporary transformations in the US and internationally. With its multidisciplinary focus and emphasis on developing Spanish cultural and linguistic skills, the LALS major will offer an important forum for training the next generation of student leaders as well. The program builds on current extracurricular activities sponsored through MSU to support leadership skills as well as fostering a sense of civic duty within students. Students will be encouraged to participate in the Tías y Tíos (“Aunts and Uncles”) tutoring and Sunday activities that support local Latino youth. In addition, we have partnered with MT-Tech on the Engineers without Borders project in El Salvador. For the next five years, our students will be part of the project that has been assigned to MT-Tech in a small town an hour outside San Salvador. There are also ongoing opportunities to teach Spanish in the Bozeman Public schools. In conjunction with study abroad opportunities throughout Latin America and the continuing importance in understanding Latino communities throughout the US, the LALS option will continue to be attractive to students with a diverse set of long-term professional and personal goals.

**C. What is the anticipated demand for the program? How was this determined?**

The LALS option will graduate about 15 to 20 students per year. The anticipated demand for the program is based on the current number of students enrolled in the minor as well as a comprehensive questionnaire submitted in Latin American and Latino themed courses to determine demand. Based on advisors' collection of data, there are approximately 100 declared minors or students intending to declare a minor in Latin American and Latino Studies. These students self-identify as being much more interested in Latin American and Latino issues than in our traditionally bound language and literature option. The questionnaires indicate that students from a wide range of fields are already seeking out LALS courses and that they do so in order to enhance their career futures. More than half of those interested in or intending to declare the minor are pursuing programs of study outside the humanities and social sciences; the most sizeable groups are majors in engineering and health/premedical programs. These figures indicate that students in non-humanities majors consider this area of cultural, historical, and linguistic literacy vital to their marketability and professional success in those fields. These students are more interested in acquiring a multidisciplinary literacy rather than a single discipline's approach to the area. Consistently heavy enrollments in Latin-America themed courses and robust student interest in the LALS non-teaching minor signal the success of this program and justify the creation of an LALS major.



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**4. Institutional and System Fit**

**A. What is the connection between the proposed program and existing programs at the institution?**

The LALS option builds on the LALS minor (which will stay in place) and represents a restructuring of disparate, but related, resources in the Modern Languages & Literatures and Sociology & Anthropology departments. Considering the growing Latino population in the state of Montana, and in Gallatin County in particular, the LALS Major will be a superb complement to research and teaching in a number of other departments such as Nursing, History, Health, Education, and Political Science. Students from these disciplines are already taking our Latin American/Latino-themed courses.

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

No, approval of the proposed program will not require changes to any existing programs at the institution.

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

The LALS option differs considerably from the Hispanic Studies option. It is the same difference that exists between English (language and literature) and American Studies (interdisciplinary). Hispanic Studies focuses on language proficiency and a survey of cultures and societies of Spain and Latin America mainly through the study of literature. The great majority of upper-division content courses are taught in Spanish and students need to have advanced language skills to take these classes. Hispanic Studies is thus a more traditional track.

The Latin American and Latino Studies option presents a much more comprehensive and in-depth program of study than the current minor. The LALS option also provides a broader multidisciplinary approach to Latin American and Latino societies and cultures than the Hispanic Language and Literature option can offer. In addition, the Latino Studies component of the curriculum in the new option is designed to educate students about the fastest growing minority group in the United States, including states like Montana. Most courses in LALS are taken in English.

**D. How does the proposed program serve to advance the strategic goals of the institution?**

The Latin American and Latino Studies option fits perfectly within Montana State University's institutional goals. More specifically, it aligns with the President's recent commitment to "a significant expansion of interdisciplinary programs at MSU," her "MSU Moving Mountains." President Cruzado describes Moving Mountains as "an initiative that will challenge faculty to develop new research and creative projects that will reinforce our success rate for competitive external funds in interdisciplinary initiatives. The vibrant programs that can result from this effort will significantly enhance our recruitment and retention of students and faculty interested in comprehensive topics involving multiple disciplines linked through integrated approaches. Such a project will also capitalize on opportunities for collaboration between all our campuses and with universities throughout the entire state." We envision securing external funds through grants that emphasize interdisciplinary projects. For example, the Andrew W. Mellon Foundation through the American Council of Learned Societies' Collaborative Research Fellowships supports collaborative research in the humanities and social sciences. One such project would focus, for instance,

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on Latino immigrants in Bozeman from a cultural, community health, and sociological perspective. Another possible source of funding is a USAID federal grant. An example of such grant is the Mexican Partnership Program, in which faculty and students from departments such as MLL and Engineering would partner with Mexican NGOs to engage civil society in promoting clean energy technologies and reduce deforestation.

In addition, the LALS option will serve to advance the goals put forth in the current draft of the new strategic plan for Montana State University, particularly in the areas of Integration, Learning, and Engagement. Students in the LALS option will have the incredible opportunity of working with professors from different disciplines with the added bonus of knowing that these professors are themselves working together. The interdisciplinary nature of LALS provides students with an edge in their future careers and job placement. In today's highly competitive job market, an employer who, for instance, needs an engineer for its global company, everything else being equal, the employer is likely to hire the candidate who is able to understand the needs and context of other countries. Service learning is a key component of this program and aligns closely with MSU's new designation as a Carnegie Outreach Institution. We plan to continue developing service learning opportunities which will make the LALS program unique in the region by fully integrating student learning with the needs of the community. The LALS option also aims to build on the land grant mission by disseminating knowledge about Latinos in Montana and throughout the US to Montana citizens and by working to pinpoint areas of special need for the growing numbers of Latinos in the state. Such needs may include Spanish-English translation work at educational, medical, and law institutions throughout Gallatin County.

- 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 Montana University system has no similar option. Thus, our proposed transformation of the minor will create the first Latin American and Latino Studies program in the state. The University of Montana, Missoula, has a minor in Latin American studies but it does not include a specific institutional focus on Latino issues. Professor Linda Gillison, Chair of the Department of Modern and Classical Languages and Literatures at UM supports our initiative to create an LALS major option at MSU.

### 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.**

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**Latin American and Latino Studies Curriculum Option**

| CLASSES   | SCHEDULE   | CREDITS              |
|---|--|----------------------|
| <b>Foundation Courses</b><br>HSTR 130D: Latin American History (4 cr.)<br>ML 100: Introduction to World Cultures (3 cr.)  | Fall<br>Spring   | <b>7 credits</b>     |
| <b>Language Requirement</b><br>SPNS 101–220: (14 cr.)<br><i>Or equivalent acquired through CLEP exam, course work in high school, or study abroad; ML 291: Medical Spanish may be substituted for one of these courses.</i><br><br>SPNS 323: Adv. Grammar and Phonetics (3 cr.)   | F, S, Summer<br><br><br>Fall   | <b>17 credits</b>    |
| <b>Area Requirements</b><br><br><b>Group 1: Latin America (12 credits)</b><br><br>SPNS 329: Cultures and Societies of Early Latin America<br>SPNS 330: Cultures and Societies of Modern Latin America<br><br>SPNS 332: Contemporary Latin American Lit.<br>SPNS 361: Hispanic Texts and Cinema (Latin America)<br>SPNS 335IH: Travel in Latin American Film and Lit (in English)<br><br>SPNS 416: Spanish Culture and Revolution (Latin America)<br>SPNS 430: Latin American Perspectives (in English)<br>*SPNS 445: Hispanic Caribbean (in English)<br><br><b>Group 2: U.S. Latino History and Cultures (12 credits)</b><br><br>SOCI 368: Immigration and Inequality: Latinos in the U.S.<br>SOCI 370: Sociology of Globalization<br>SPNS 350: U.S. Latino History & Culture<br>SPNS 351: U.S. Latino Literature<br>*SPNS 280: U.S. Latino Text and Cinema (in English)<br>*SPNS 280: Chicanos and the Southwest (in English)<br><br><b>Group 3: Spain (3 credits)</b><br><br>SPNS 320: Spanish Culture and Civilization<br>SPNS 362: Hispanic Poetry<br><br>*currently being proposed | Spring<br>Fall<br>Spring<br>Spring<br>Summer<br>Fall<br><br>Fall<br>Spring<br><br>F<br>S<br>F<br>S<br>F alternating<br>S alternating<br><br>F<br>F | <b>27 credits</b>    |
| <b>Research Capstone</b><br><br>SPNS 470R: Capstone Seminar   | Fall, Spring   | <b>3 credits</b>     |
| <b>OPTIONAL: Service Learning Component</b><br><br>Tías y Tíos (actividades para niños)<br>Tías y Tíos tutoring<br>Spanish in the Public Schools<br>Adult ESL Tutoring (Belgrade)<br>Engineers without Borders-El Salvador  |  | <b>3 credits</b>     |
| <b>Total credits required for major =</b>   |  | <b>54-57 credits</b> |

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

The LALS option would be available to students beginning in Fall 2013. The initial target is for 15 to 20 major students, increasing to 25 to 30 graduates per year after the first five years the major is available.

**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 additional faculty resources will be required to implement this program. The resources to initiate the program are already in place as a result of internal reallocation. Further support for the program will occur as vacant faculty lines are filled in areas relevant to this program (e.g. History).

**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 other additional resources are required to ensure the success of the proposed program. All of the courses required in the proposed curriculum have already been developed and are part of the regular offerings of the departments. Shifting student demand could lead to greater numbers of sections of these courses being offered, which will reduce the need for other courses within the departments. Student advising demands will increase, but we expect this to be manageable with current departmental resources. We will make do, as we have been, until such time as resources are available.

**7. Assessment**

**How will the success of the program be measured?**

Graduation numbers continue to be tracked for the Latin American Studies minor program. We will extend the tracking process for the major degree program as well. Informal assessments of students' views on courses and the major will be obtained through student advising. Such assessments will form the basis of questionnaires used to evaluate the major and minor degree programs from the student perspective. The Department is currently creating assessment guidelines being monitored by the Associate Dean of the College. We will do the same for this program. The Latin American and Latino Studies major and minor will be subject to program review as well, as part of the normal BOR process.

**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 Latin American and Latino Studies program was created in 2006 and approved by the Board of Regents as a minor in 2007. Since it was introduced, student response to the minor has been strong with approximately 100 students having declared or intending to declare the minor currently. Through informal discussions with students and more formal meetings amongst the Latin American and Latino Studies faculty on campus, we strongly feel the demand for an option exists and that it fills an important gap in the University's curriculum.

August 6, 2012

**ITEM 156-2003-C0812**  
**Minor in Materials**

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**THAT**

The Board of Regents of Higher Education authorizes Montana State University-Bozeman to establish a Minor in Materials

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**EXPLANATION**

MSU-Bozeman requests approval to establish a Minor in Materials for students majoring in Mechanical Engineering and other technical disciplines at Montana State University. The Minor will complement the ongoing inter-disciplinary materials science research activities in the College of Engineering, Physics, and Chemistry, providing students additional and valuable breadth to their degree.

The inter-disciplinary field of materials science and engineering has become critical to many emerging areas of advanced technology and their applications. As a result, there are needs and opportunities for engineers and scientists with education and training in materials science and engineering. Further, engineering students are increasingly interested in pursuing fields of study in which they can make a difference for which materials science and engineering can help augment their major studies and help students achieve their goals in engineering. The goal of the Minor in Materials is to provide students at MSU with such education and training that will enable them, upon graduation, to not only participate in projects or programs of an inter-disciplinary nature but also address challenging societal needs and complex technological advances.

Integrating the Minor in Materials with Mechanical Engineering is an ideal opportunity to leverage students existing design knowledge and Capstone project work with intelligent materials selection and thus adding design degrees of freedom. Modern breakthroughs are seldom achieved with new materials or mechanical design alone, but through an integrated process, for which this minor will enable our students to participate. While the program is initially developed to serve Mechanical Engineering students, it is anticipated that the minor can be expanded more generally to the College of Engineering and College of Letters and Sciences.

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**ATTACHMENTS**

Level II Request Form  
Curriculum Proposal

**Montana Board of Regents**  
**LEVEL II REQUEST FORM**

Item Number: 156-2003-C0812 Meeting Date: August 6, 2012  
Institution: Montana State University – Bozeman CIP Code: 14.1801  
Program Title: Minor in Materials

Level II proposals require approval by the Board of Regents.

**Level II action requested (place an X for all that apply and submit with completed Curriculum Proposals Form):**

Level II proposals entail substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other campuses within the Montana University System and community colleges. Board policy 303.1 indicates the curricular proposals in this category:

- 1. Change names of degrees (e.g. from B.A. to B.F.A.)
- 2. Implement a new minor or certificate where there is no major or no option in a major;
- 3. Establish new degrees and add majors to existing degrees; and
- 4. Any other changes in governance and organization as described in Board of Regents' Policy 218, such as formation, elimination or consolidation of a college, division, school, department, institute, bureau, center, station, laboratory, or similar unit.

**Specify Request:**

MSU-Bozeman requests approval to establish a Minor in Materials for students majoring in Mechanical Engineering and other technical disciplines at Montana State University. The Minor will complement the ongoing inter-disciplinary materials science research activities in the College of Engineering, Physics, and Chemistry, providing students additional and valuable breadth to their degree.

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**1. Overview**

The inter-disciplinary field of materials science and engineering has become critical to many emerging areas of advanced technology and their applications. As a result, there are needs and opportunities for engineers and scientists with education and training in materials science and engineering. Further, engineering students are increasingly interested in pursuing fields of study in which they can make a difference for which materials science and engineering can help augment their major studies and help students achieve their goals in engineering. This serves to increase student satisfaction of MSU's engineering education and ultimately increase enrollment in engineering at MSU.

**2. Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.**

We propose a new Minor in Materials for students majoring in Mechanical Engineering and other technical disciplines at Montana State University. The Minor will complement the ongoing inter-disciplinary materials science research activities in the College of Engineering, Physics, and Chemistry, providing students additional and valuable breadth to their degree.

**3. Need**

**A. To what specific need is the institution responding in developing the proposed program?**

One goal of the Minor in Materials is to provide students at MSU with such education and training that will enable them, upon graduation, to not only participate in projects or programs of an inter-disciplinary nature but also address challenging societal needs and complex technological advances. Another goal is that the Minor in Materials motivate students toward graduate study in materials-related areas. Advances in materials have driven the development of human civilization and are a key factor in most modern technological progress. Material properties, material processing issues, or material costs are the limiting factors in the design or performance of almost all systems around us: computers, aircraft, automobiles, transportation infrastructure, prosthetics and other biomedical devices, to name just a few. Engineers, scientists, and managers in all technological sectors often must make material selection decisions based on a variety of considerations, including properties, performance, environmental impact, and cost. Material failures or inappropriate material selection decisions are often a factor in tragic loss of human life or financial losses for corporations.

MSU is endeavoring to become a nationally recognized energy research institute including focused efforts on wind, solar, and direct energy conversion for which skilled engineers knowledgeable in multi-functional materials and design are needed for industrial development. Current materials related inter-disciplinary research activities at MSU in ME, ChBE, EE, Physics, and Chemistry are growing rapidly; however, there are no dedicated materials science educational programs to help train undergraduate researchers and future graduate students at MSU. Integrating the Minor in Materials with Mechanical Engineering is an ideal opportunity to leverage students existing design knowledge and Capstone project work with intelligent materials selection and thus adding design degrees of freedom. Modern breakthroughs are seldom achieved with new materials or mechanical design alone, but through an integrated process, for which this minor will enable our students to participate. While the program is initially developed to serve Mechanical Engineering students, it is anticipated that the minor can be expanded more generally to the College of Engineering and College of Letters and

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Sciences. Broad areas of interest in materials include:

- *Biomedical engineering*: Prosthetic devices, materials science of skin and bone
- *Chemistry and chemical engineering*: Material synthesis and processing.
- *Civil engineering*: Construction, infrastructure, and transportation materials
- *Electrical engineering*: Solid state devices.
- *Mathematics*: Modeling and computation of material structure, properties, and processes.
- *Mechanical engineering*: Selection of materials for mechanical designs
- *Physics*: Solid state devices. Learn more broadly about the properties and applications of materials.

**B. How will students and any other affected constituencies be served by the proposed program?**

Based on national and regional demands, extended breadth of research opportunities and funding sources in the materials sciences, most Carnegie Category 1 universities have either a dedicated Materials Science and Engineering department or have a dedicated Materials Science and Engineering major degree program within their respective college of engineering. For those universities without a discrete department, the Materials Science and Engineering program often resides within the Mechanical Engineering department, thus supporting the goals of this minor program from a national perspective.

While many MSU mechanical engineering graduates seek employment in engineering design positions in automotive, aerospace, and bio-medical fields, the incorporation of the Minor in Materials program could improve the academic preparation of undergraduates and create new opportunities for our students to excel with jobs in research and development as well as inter-disciplinary work within the basic sciences supporting STEM education goals. This in turn can also encourage our Mechanical Engineering students to pursue graduate studies throughout engineering, as well as Physics and Chemistry, such that we can facilitate new generations of students skilled in both the sciences and engineering, providing vital professional skills.

**C. What is the anticipated demand for the program? How was this determined?**

An interest in materials education is routinely mentioned by ME juniors and seniors looking for intern and research experience as well as students interested in graduate studies. The M&IE Department recently developed a new materials course, EMAT 350-Engineering Materials, developed as a professional elective for ME students. Student interest in the course and enrollment has consistently exceeded course enrollment limits, and in both mid-semester and Knapp evaluations, students indicate that they believe the course enhances their education such that it could very beneficial as a required ME course. The ME department has extensive research programs in functional materials/ceramics processing, aerospace structures/composites, MEMS, and fluid flows in porous structures all of which can be directly benefited by expanded materials courses thus enabling students to engineer the material in addition to the structures. Using a conservative estimate that 10% of



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Mechanical Engineering undergraduates pursue a minor, with nearly 700 undergraduates, enrollment in the Minor is expected to be strong not including participation from other majors.

The important synergy between Mechanical and Materials Engineering is also supported by the latest information from the Bureau of Labor Statistics, Occupational Outlook Handbook (2010-2011 Outlook). Even though Materials Science and Engineering is inherently inter-disciplinary across many engineering and science fields, it is specifically indicated that growth in both Materials and Mechanical Engineering disciplines were notably leveraged from emerging technologies in non-traditional materials/composites, as well as bio and nano technology. <http://www.bls.gov/oco/ocos027.htm>

*Materials engineers are expected to have employment growth of 9 percent over the projections decade, about as fast as the average for all occupations. Growth should result from increased use of composite and other nontraditional materials developed through biotechnology and nanotechnology research. As manufacturing firms contract for their materials engineering needs, most employment growth is expected in professional, scientific, and technical services industries.*

*Mechanical engineers are expected to have employment growth of 6 percent over the projections decade, slower than the average for all occupations. Mechanical engineers are involved in the production of a wide range of products, and continued efforts to improve those products will create continued demand for their services. In addition, some new job opportunities will be created through the effects of emerging technologies in biotechnology, materials science, and nanotechnology. Additional opportunities outside of mechanical engineering will exist because the skills acquired through earning a degree in mechanical engineering often can be applied in other engineering specialties.*

#### 4. Institutional and System Fit

**A. What is the connection between the proposed program and existing programs at the institution?**

The proposed Minor is a conglomeration of Mechanical and Chemical Engineering as well as Physics and Chemistry. Currently, MSU does not have any similar program, particularly one that bridges both college and university disciplines.

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

The minor is leveraged from currently offered courses in ME, ChBE, Physics, and Chemistry such that no new courses need to be developed to start the proposed Minor program. While courses are currently in place, some courses have a prerequisite structure that is designed to limit enrollment to within the departments' student base only. Agreements with instructors and other departments will need to be formalized to offer the broadest base of materials related courses.

As the materials research activities in the M&IE Department and across campus continue to grow it is anticipated that additional materials related coursework will be offered that can further support the minor and offer additional areas of specialization in materials.

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

There is no counterpart of this Materials Minor at MSU.

**D. How does the proposed program serve to advance the strategic goals of the institution?**

Montana State University has 6 strategic goals and the College of Engineering has 3 strategic goals as outlined below. The Minor in Materials ideally meets the goals the University and COE have put forth in discovery and innovation.

Montana State University:

1. A dynamic, committed student body comprised of high-ability, high-achieving students who thrive in a challenging academic environment.
2. Leadership in the nation in the integration of learning and the discovery of knowledge for undergraduate students.
3. Academic excellence that is characterized by world-class faculty and staff across the spectrum of the university.
4. World-changing research that enhances the student experience, advances economic prosperity in the state, and enables the nation to meet the challenges of the 21st century.
5. Integration of Montana State University into the fabric of the state and beyond.
6. Enhancement of the campus infrastructure in a manner that is sustainable, efficient and maintains the heritage and natural beauty of the academic setting

MSU College of Engineering:

1. Prepare the MSU COE community to engage effectively with the global community.
2. Build on growing college synergy and increase cross-disciplinary activities at every level of the COE community, including not only faculty research and creative activity but also the student experience.
3. Establish the college as a leader in the state and national technological community.

One of the key aspects of the Minor in Materials, as evidenced in the list of courses below, is the diverse learning environment created through several different departments and colleges across the MSU campus. This inter-disciplinary program will expose Mechanical Engineering students to the global community of different engineering and science majors through a focus on materials. The materials research community at MSU is strongly focused on renewable and energy conversion/storage, nano-technology, and biological systems such that the educational goals of this program will enable mechanical engineers to integrate with research teams across the campus that will facilitate a broader spectrum of job opportunities and potential for job satisfaction of ME graduates. This in turn fosters innovation and leadership in our future MSU educated mechanical engineers.

**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**

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**have been developed for the substantially duplicated programs, please include the agreement(s) as part of the documentation.**

Montana Tech currently offers B.S. and M.S. degrees in Metallurgical & Materials Engineering (M&ME) with a stronger focus on mining and extractive processes. Montana Tech also offers a Materials Science Minor (MSM). However, there are significant differences between the two minors. The minor at MT Tech requires 8 courses and a maximum of 18 credit hours. In contrast, to achieve the proposed Minor in Materials at MSU would require 11 courses and 29 credit hours (see below). In addition, of the 20 courses from which the 11 required courses are selected, fully 70% (14) are only available at MSU. Moreover, the 20 courses at MSU represent 6 different course rubrics (CHMY, ECHM, EMAT, EMEC, ETME, PHSX) compared to 3 (CHMY, EGEN, EMAT) at MT Tech. While the proposed Minor in Materials at MSU is designed for Mechanical Engineering majors (among others), M&ME students at MT Tech are not eligible for the Materials Science Minor.

The proposed Minor in Materials program at MSU provides an inter-disciplinary educational experience for undergraduates with coursework that spans multiple colleges. Further this Minor is also based on active research activities and collaborations more strongly associated with functional (energy) materials, ceramics, and composites for which MSU has a pronounced expertise that is nationally recognized.

**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.**

Students seeking the Minor in Materials must *satisfy the core and additional course requirements, 29 credits total, as outlined below:*

*Required Pre-requisite Courses: (credits not counted towards minor)*

| Course # | Course Title                |
|----------|-----------------------------|
| M 171Q   | Calculus I                  |
| M 172Q   | Calculus II                 |
| PHSX 220 | General & Modern Physics I  |
| PHSX 222 | General & Modern Physics II |
| CHMY 141 | College Chemistry I         |

*Required Courses: (or equivalent courses as approved by the certifying officer)*

| Course # | Course Title                           | Credits |
|----------|--|---------|
| EMAT 251 | Materials Structures and Properties    | 3       |
| EMAT 252 | Material Structures and Properties Lab | 1       |

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|          |                             |   |
|----------|-----------------------------|---|
| ETME 215 | Manufacturing Processes     | 3 |
| ETME 217 | Manufacturing Processes Lab | 1 |
| EMAT 350 | Engineering Materials       | 3 |

These courses (11 credits) represent the core fundamentals of materials science and are applicable to students in the College of Engineering in addition to Physics and Chemistry. Students pursuing a BS in Engineering or the Physical Sciences will have to take 18 additional course credits (6 courses) out of the list below to obtain a Minor in Materials which may also serve as electives in the students major. Other courses may also be approved by the certifying officer with a written request detailing the merit of the course.

*Additional Courses: (no more than 3 courses may be taken from a single rubric)*

| Course #  | Course Title                      | Credits |
|-----------|-----------------------------------|---------|
| CHMY 371  | Quantum Chemistry – Part 1        | 3       |
| CHMY 373  | Thermo & Kinetics – Part 2        | 3       |
| CHMY 401  | Advanced Inorganic Chemistry      | 3       |
| ECHM 424  | Transport Analysis                | 3       |
| ECHM 452  | Advanced Engineering Materials    | 3       |
| EMEC 444  | Mechanical Behavior of Materials  | 3       |
| EMEC 465  | Bio-inspired Engineering          | 3       |
| EMEC 467  | Micro Electro Mechanical Systems  | 3       |
| PHSX 441* | Solid State Physics               | 3       |
| PHSX 442  | Novel Materials for Physics & Eng | 3       |
| EMAT 460  | Polymeric Materials               | 3       |
| EMAT 463  | Composite Materials               | 3       |
| EMAT 552  | Advanced Ceramics                 | 3       |
| EMAT 553  | Advanced Composite Materials      | 3       |
| EMAT 563  | Smart Structures                  | 3       |

*\*course pre-requisites not included in the lists above do not count towards the 18 credits*

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

While filing the *Application for Baccalaureate Degree* for the major, students pursuing the Minor in Materials will also have to submit the *Application for a Non-teaching Minor* by the deadlines set forth in the University Catalog. Dr. Sofie will serve as the Minor certifying officers for the Mechanical & Industrial Engineering Department and will certify that the M&IE students have completed the required course credits (as given in Section 4a) for the Minor in Materials.

The Minor in Materials is primarily applicable to students majoring in Mechanical Engineering, although students majoring in ChBE, EE, Physics, and Chemistry may also be interested given the breadth of courses offered in this minor. It is estimated that up to 20 students may be enrolled in the Minor shortly after its commencement based on our experience with the Aerospace and Mechatronics Minor's currently offered.

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As students enroll in the program from other COE departments as well as the College of Letters and Science, standard course equivalencies will be drafted and incorporated into the Minor to identify the curriculum path for non-ME majors.

**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 faculty resources are needed to implement the Materials Minor program. The Minor has been initially developed within the framework of the current catalogs, curricula, courses, and teaching schedules, therefore no new courses need to be developed. The College of Engineering has many faculty members who have the necessary background in the related fields to provide student advising and counseling as part of their regularly assigned advising duties.

**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 additional resources are required for successful implementation of the Minor as we do not need to develop any new courses. However, the participating departments must accommodate the inevitable increase in administrative overhead necessary to process the *Application for a Non-teaching Minor* paperwork when the student is ready to graduate. This additional work is modest, and occurs just once for each student at the time of graduation.

The Minor in Materials is primarily applicable to students majoring in Mechanical Engineering, although students majoring in ChBE, EE, Physics, and Chemistry may also be interested given the breadth of courses offered in this minor. It is estimated that up to 20 students may be enrolled in the Minor shortly after its commencement based on our experience with the Aerospace and Mechatronics Minor's currently offered.

**7. Assessment**

**How will the success of the program be measured?**

The M&IE Department in the College of Engineering incorporates a systematic assessment plan (<http://www.montana.edu/wwwprov/assessment/assessmentplans.htm>) for all of the academic programs and courses. We continually assess objectives and outcomes at the program and course levels. These assessments are mandatory for our continued national accreditation (ABET), and we must demonstrate the assessment and evaluation processes as part of the periodic accreditation review. Therefore, our current assessment plans and evaluation methods will be applied consistently to the Materials Minor.

In addition, we will provide specialized assessment based on student, employer, and alumni satisfaction towards the Minor through appropriate surveys. The M&IE Department has been doing this kind of survey for many years to assess the outcomes of the Mechanical Engineering program. Any changes in student enrollment or graduation rate will be monitored, reviewed, and the program will be revised accordingly.

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**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 present Minor in Materials proposal was presented before the Industrial Advisory Board (IAB) of the Mechanical & Industrial Engineering Department. The IAB was very supportive of the proposal and they responded strongly in favor of moving forward with the Minor. Several members indicated that the incorporation of materials curriculum would be a direct benefit for graduates seeking employment and provide a valuable component to future engineers.