

MONTANA BOARD OF REGENTS

LEVEL II REQUEST FORM

Item No.:	140-1001-R0908	Date of Meeting:	September 25, 2008
Institution:	The University of Montana—Missoula		
Program Title:	Establish an M.S. and Ph.D. in Medicinal Chemistry		

Level II proposals require approval by the Board of Regents.

Level II action requested (check all that apply): 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;
- 4. Expand/extend approved mission; and
- 5. 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:

The University of Montana – Missoula requests permission to establish a Masters and Doctoral program in Medicinal Chemistry.

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

The University of Montana—Missoula requests approval to establish a Masters and Doctoral program in Medicinal Chemistry. Medicinal Chemistry is a scientific discipline at the interface of chemistry and [pharmacy](#) that trains students to design and develop pharmaceutical [drugs](#), and is consistently at the forefront of biomedical research. It is one of a few advanced training areas with its foundation in classical undergraduate education and serves as a required discipline in Pharmacy.

NEED. a. To what specific need is the institution responding in developing the proposed program?

The desire to develop a new graduate program results from the rapidly emerging research capacity and teaching strengths in Medicinal Chemistry at UM, and the clear link to medically-oriented research, development, and technology-transfer on the UM campus. There continues to be a regional and national need for medicinal chemists to fill growing opportunities in the biotechnology industry. A Medicinal Chemistry program at The University of Montana would emphasize neuroscience as its research specialty providing a unique focus niche. In addition, it would amplify and strengthen collaborations with the existing PhD/MS program in Neuroscience and Neuroscience programs throughout the country.

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

The University of Montana—Missoula mission statement calls for pursuit of academic excellence by providing unique educational experiences through integration of graduate study and professional training with interdisciplinary emphases. The proposed program in Medicinal Chemistry will be founded in an integrative didactic, practical, laboratory, professional and leadership experiences to train graduate students for careers in drug discovery, pre-clinical medical research, and biotechnology. Undergraduates benefit from the practical applications derived from chemistry, biology, physics, math, and computer science from which Medicinal Chemistry draws its combined training. The Medicinal Chemistry program is expected to be a highly prolific contributor to economic development on the UM campus through drug discovery, composition, device patents, licensing, invention disclosures, intellectual property and possibly, the sales of small molecules. It is expected that the Medicinal Chemistry program will show a return on investment and/or positive revenue stream within seven years.

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

We anticipate demand to be approximately five entering students per year or, on average, approximately twenty-five students enrolled in the program at one time. These numbers roughly reflect our prior experience with students admitted to our neuroscience and toxicology graduate programs, and represents average enrollment among similar sized Medicinal Chemistry graduate programs nationwide. There are currently 13-15 graduate students enrolled in related disciplines working in the area of medicinal chemistry at UM with various faculty mentors. Given this high interest with no existing graduate program, no advertising, and no support, we anticipate that a doubling of the number of students is a relatively modest estimate. Because Medicinal Chemistry programs are widely sought and applied to graduate programs, we expect applicants to admissions ratios of about 25:1.

3. INSTITUTIONAL AND SYSTEM FIT: a. What is the connection between the proposed program and existing programs at the institution?

The proposed program will be the fourth graduate program admitted within the Department of Biomedical and Pharmaceutical Sciences (BMED). If approved, it will join the Neuroscience

PhD/MS, Toxicology PhD/MS and Biomedical Sciences PhD degree programs, and the Pharmaceutical Sciences MS program. There is also a minor connection to the Chemistry PhD/MS program in the form of select cross-listed courses.

To more rapidly strengthen the Medicinal Chemistry graduate program, expand collaborations, and broaden opportunities for extramural funding, the program will emphasize neuroscience as its research core area. Owing to the strong presence of the Center for Structural and Functional Neuroscience (CSFN) and the natural bridge several of the Medicinal Chemistry faculty have with research interests in the CSFN, it became obvious to emphasize neuroscience as the Medicinal Chemistry research core. As such, the Medicinal Chemistry graduate program will work on the development, structure, function, chemistry, pharmacology, biochemistry, physiology, pathology and pre-clinical treatment of the nervous system. The goal of the medicinal chemist studying neuroscience will be to develop small molecules and drugs that help study and treat diseases of the nervous system. The overall goal of many of these studies will be to develop new therapeutic approaches for the treatment of central nervous system (CNS) diseases like Alzheimer's, ALS, Parkinson's, stroke, Depression, as well as the development of new strategies for the treatment of CNS injuries. Thus, the key program connection for the Medicinal Chemistry program is the Neuroscience program.

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

No.

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

Medicinal chemistry is the study and application of chemical research techniques to the design, synthesis and utility of pharmaceuticals, thereby making Medicinal Chemistry a distinctive investigative branch of both Pharmacy and Medicine. Decades ago, scientists isolated medicinal agents found in plants but today, medicinal chemists are equally concerned with the creation of new synthetic drug compounds. Medicinal Chemistry draws upon newly discovered mechanisms in protein structure and function and use state-of-the-art approaches including informatics, computer modeling, genomics and proteomics. The focus on the development of new synthetic drug compounds has resulted in the incorporation of many other disciplines, such as biochemistry, genetics, computer science, and molecular biology, into medicinal chemistry. Though integration and collaboration with numerous other scientific disciplines are common, Medicinal Chemistry is almost always geared toward drug discovery and development.

The proposed Medicinal Chemistry graduate program differs from the other three programs in BMED in that the training will be highly experiential with graduate level laboratory training, strong integration of the basic science of chemistry, and focus on developing future employers rather than employees. The Medicinal Chemistry graduate program will have significant emphasis in economic development, intellectual property, patents and operations as related to biotechnology. The proposed Medicinal Chemistry graduate program differs from the Chemistry graduate program in its coursework emphasis on drug design, development and analysis, and its research emphasis in neuroscience.

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

The proposed program in Medicinal Chemistry is consistent with the Vision and Goals of the Montana University System with respect to creating a learning and discovery environment and importantly, a conduit for economic development through new patents, intellectual property & concepts, and inventions. Training in medicinal chemistry responds to a deep and consistent

nationwide need in the biotechnology job market and will foster local and regional scientific development and technology transfer.

The University of Montana is a doctoral level University, committed to a diversity of programs that balance liberal learning and professional preparation. The University continues to evolve its technology-driven disciplines while responding to the needs of the citizens of Montana in providing excellence in undergraduate and graduate education. The proposed Graduate Program in Medicinal Chemistry is consistent with the mission of the University, as this program will create a unique learning environment for graduate and undergraduate students through new research knowledge and other creative activities, which will ultimately contribute to the economic development of Montana. Undergraduate students will benefit from expanded curriculum development and further gain from opportunities for employment and research training experiences because of external grants and contracts generated by the faculty. This interactive environment will facilitate the involvement of undergraduates in the research enterprise and will encourage interactions of undergraduate students with faculty, postdoctoral fellows, and graduate students in the laboratory setting. Likewise, pharmacy students will have the opportunity to participate in on-going research.

A Ph.D. program in Medicinal Chemistry at the University of Montana would amalgamate current expertise and resources in education, research, and technology to generate a comprehensive graduate training program in a regionally underserved area. The strengths of the Medicinal Chemistry graduate program would reside in the commitment to undergraduate and graduate teaching, existing and planned research expertise of the Medicinal Chemistry faculty, students and staff, and key collaborations with investigators in the Center for Structural and Functional Neuroscience, the Center for Environmental Health Sciences, the Center for Biomolecular Structure and Dynamics, and several academic departments. The proposed graduate program in Medicinal Chemistry would provide an exceptional training opportunity for students that meet national and regional 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.

There are no similar programs in the State of Montana. A comparison of regional programs is provided:

Montana: No formal Ph.D. training programs in Medicinal Chemistry are available for students. Montana State University has a Chemistry graduate program that is similar in structure to the Chemistry graduate program at The University of Montana. However, neither have a research/programmatic track in Medicinal Chemistry nor a research emphasis in neuroscience.

North Dakota: The School of Pharmacy at North Dakota State University offers a PhD. in Pharmaceutical Sciences. There is no program in Medicinal Chemistry.

South Dakota: The South Dakota State School of Pharmacy does not offer graduate training or any level of training in Medicinal Chemistry.

Idaho: The University of Idaho has a PhD in Program in Chemistry only.

Washington: The University of Washington has a Medicinal Chemistry PhD program in the School of Pharmacy. Training and research foci include: protein engineering and site-directed mutagenesis as probes of enzyme mechanism and regulation, role of mammalian heat shock proteins, solution state NMR to study the structural biology of the interaction of proteins in the immune system, respiratory diseases and breast cancer, protein folding, drug metabolism, infectious diseases, proteomics, prostate cancer, monooxygenases and cytochrome P450 and their role in in vivo drug interactions, drug metabolism, opioids, monooxygenases and cytochrome P-450, stable and radioactive isotopes. The Washington State University School of Pharmacy offers PhD programs in Pharm/Tox and Pharmaceutical Sciences (no Medicinal Chemistry program). Select faculty have interests in medicinal chemistry.

Oregon: The University of Oregon has a PhD in Program in Chemistry only. A few faculty specialize in medicinal chemistry research.

Utah: The University of Utah offers a program in Medicinal Chemistry in the School of Pharmacy. Training and research foci include: anti-cancer drugs, computational modeling, anti-HIV drugs, chemical biology of cell surface-bound carbohydrates, anti-infective and anti-parasitic drugs, elucidation of small molecule structures, bacterial and fungal biosynthetic pathways, novel biopolymers for site-targeted drug delivery, and fabrication of biocompatible materials for tissue engineering and wound repair.

Colorado: There are no Medicinal Chemistry PhD programs in Colorado. The University of Colorado, Boulder and Colorado State University have PhDs in Chemistry. A few faculty specialize in medicinal chemistry research. The University of Colorado Health Sciences Program (School of Pharmacy) has a Program in Biomolecular Structure that encompasses many elements of Medicinal Chemistry, but no formal training.

Wyoming: The University of Wyoming has a PhD in Program in Chemistry only. A few faculty specialize in medicinal chemistry research. The University of Wyoming Pharmacy School does not offer a Medicinal Chemistry PhD or MS program.

4. 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.

Core Curriculum

BMED 615	Molecular Pharmacology	3 cr.
BMED 621 ¹	Drug Design, Development and Discovery & Lab	4 cr.
BMED 622 ²	Drug Pharmacodynamics – Drug Receptor Interactions & Lab	4 cr.
BMED 623 ²	Drug Diversity and Target-Oriented Synthesis	3 cr.
BMED 627 ^{2,3}	Professional Development - Medicinal Chemistry	3 x 1 cr.
Total		17 cr.

¹ Lab portion of class is new. ² New course ³ Class to be taken for three semesters (content varies), 1 cr. each semester.

Students will take at least **three (Ph.D.)** or **two (M.S.)** of the following courses:

BIOC 581	Physical Biochemistry	3 cr.
BIOC 582	Peptides and Proteins	3 cr.

BIOC 588	Biomolecular Structure and Dynamics	4 cr.
BMED 600	Advanced Cellular Biochemistry	3 cr.
BMED 624	Special Topics in Medicinal Chemistry	3 cr.
BMED 625 ²	Drug Synthesis	3 cr.
BMED 641	Toxicology I	3 cr.
BMED 642	Toxicology II	3 cr.
BMED 661	Neuroscience I	3 cr.
BMED 662	Neuroscience II	3 cr.
CHEM 562	Organic Structure and Mechanism	3 cr.
CHEM 563	Organic Synthesis	3 cr.
CS 458	Introduction to Bioinformatics	3 cr.

The following are examples of additional elective courses available to meet student interests.

BMED 610	Neuropharmacology	3 cr.
BMED 630	Pharmacogenetics	3 cr.
BMED 643	Cellular and Molecular Toxicology	4 cr.
BMED 646	Neurotoxicology	2 cr.
CHEM 581	Chemical Biology	3 cr.

Research, Thesis, Dissertation

BMED 597/599 Research/ Thesis	up to 10 credits for MS Degree
BMED 697/699 Research/Dissertation	up to 30 credits for the Ph.D. Degree

Total Graduate Credit Requirements (UM)

Medicinal Chemistry PhD Summary of Credits needed:

Core/Lecture classes	=	21 credits
Lab credits (from 621/622)	=	2 credits
Workshop credits	=	3 credits
Total	=	26 credits

At least 60 credits for the Ph.D., At least 30 credits for the M.S.

Individual students may take additional courses beyond the minimum program requirements as suggested by the department or Graduate Committee. The required core classes BMED 621 and BMED 622 will be taught with a lab class in successive Fall (even yrs) and Spring (odd yrs) semesters. BMED 623 will be offered in the Fall (odd yrs). BMED 624 and BMED 625 will be offered in the Fall or Spring depending on enrollments and student needs. Students will enroll in the Professional Development BMED 627 three times within their first four semesters in residence. Each Professional Development course will require an oral presentation (seminar), written research report, a literature review, and proficiency in a scientific software program. Also covered in Professional Development 627 will be teaching methods and models, research methods, ethics, intellectual property & patents, entrepreneurial endeavors, small business opportunities (SBIR), grant writing skills, scientific writing, collaborations, safety/chemical handling/hazardous disposal, and animal and human subjects (incl. HEPA). Professional Development will also include a mock poster/presentation workshop to ready students for presentations at national meetings and conferences. Elective classes include topics offered in the other BMED graduate programs, Chemistry and DBS graduate programs, and Medicinal

Chemistry IV, for students wishing to gain a deeper understanding of medicinal chemistry concepts (for those interested in future faculty positions).

FACULTY AND STAFF REQUIREMENTS: Please indicate, by name and rank, current Faculty who will be involved with the program proposed herein.

Faculty noted below are either BMED faculty members or faculty directly involved with the Center for Structural and Functional Neuroscience (CSFN). Additional faculty can be added as program participants faculty pending approval by internal and/external advisory committees.

Dept. of Biomedical and Pharmaceutical Sciences

Howard Beall, Assoc Professor

David Freeman, Lecturer

C. Sean Esslinger, Res Assoc Professor

Katie George, Research Assoc Professor

Charles M. Thompson, Professor

Dianne DeCamp, Research Asst Professor

Richard Bridges, Professor

Nicholas R. Natale, Professor

John M. Gerdes, Assoc Professor

Michael Kavanaugh, Professor

Erica Woodahl, Asst Professor

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

Admissions and Proficiency Requirements: All students must have at the time of program entry, an undergraduate [or equivalent degree] in chemistry, biology, pharmacy, math, biochemistry, computer science or a related field. A minimum passing level at a 33-percentile (33%) on the Graduate Record Exam in 'Biochemistry, Cell and Molecular Biology' (BCMB) is required for program entry with the requirement that all students must attain a 50%-tile or higher on the BCMB GRE by July 1 of their first year in residence to continue in the program. Students scoring in the 33 to 49%-tile on the GRE BCMB will be required to take BMED 600 (Advanced Cellular Biochemistry; 3 cr.) or an equivalent in year 1 of the Med Chem program and receive a grade of 'B' or better. Student achieving greater than 50% prior to entrance in the program achieve a passing level and are exempted from retaking the BCMB GRE exam. Students may challenge the minimum BCMB test level at any time point in year one.

All students must also demonstrate proficiency in Organic Chemistry. This will be tested by requiring a score of 70%-tile or higher on the American Chemical Society (ACS) standardized exam in organic chemistry for undergraduates. Students not meeting this level of proficiency must meet one of three criteria: (a) take as one of their electives the one-semester BMED 625 'Drug Synthesis' course with a grade of 'B' or better, (b) retake the ACS Standardized exam in Organic Chemistry by June 1 of their first year in the program and pass at the 70%-tile, or (3) pass an oral comprehensive exam in organic chemistry administered by no less than two of the Medicinal Chemistry faculty.

Academic Unit & Organization: The proposed Medicinal Chemistry graduate program will be housed within the College of Health Professions and Biomedical Sciences specifically in the Department of Biomedical and Pharmaceutical Sciences. The Chair of the Department of Biomedical and Pharmaceutical Sciences will appoint a Director of the Graduate Program in Medicinal Chemistry in consultation with the Dean of the College. Prof. Chuck Thompson and Prof. John Gerdes will serve as acting co-Directors for the program until a permanent Director is appointed. The Director will serve as principal liaison with the Dean of the Graduate School and the Chair of Biomedical and Pharmaceutical Sciences on all matters relevant to graduate

applications and student progress through the program. The offering of new graduate courses will allow graduate students from others such as Biological Sciences, Chemistry, Mathematics and Computer Science at UM to expand their elective course portfolio and encourage interdisciplinary interaction. Members of other departments, schools and colleges have been or will be contacted regarding this new program and are actively encouraged to participate in this program.

Faculty, Instruction and Curriculum Responsibilities. Faculty hires were completed in Medicinal Chemistry in 2006 (approved as part of the COBRE award, R. Bridges; Center for Structural and Functional Neuroscience) and a second faculty position in Pharmaceutics (a branch of medicinal chemistry) was completed in 2007. Completion of these two faculty lines makes for a total of ten faculty in Medicinal Chemistry, at least eight of whom will have expertise in the core research area of Neuroscience. The graduate program in Medicinal Chemistry will have a strong teaching commitment. In addition, to the graduate classes and regularly offered special topics courses in Medicinal Chemistry, the Medicinal Chemistry faculty will have responsibilities for instruction in the professional pharmacy program including: Med Chem 421/422, Pharmacy lab 432, Anti-Microbials 328, Pharmaceutics 331, and Pharm Sci lab 362. Total credit coverage including the required graduate classes is 36 credits per year. Medicinal Chemistry faculty will also contribute to Integrated Studies 371/372 and Pharmacy 110, and assist as guest lecturers in a number of other BMED, DBS and CHEM graduate courses. Overall, Medicinal Chemistry faculty will average between 5 and 6 credits per faculty member per year.

Facilities and Space. One of the most exciting advantages is that the Medicinal Chemistry graduate program will not need additional facilities or space because of the new building addition to Skaggs in which the fourth floor has been designated for Medicinal Chemistry. The floor plan has a director & administrator office suite, six faculty offices, computing facility, three well-equipped large labs, graduate students offices, lecture and meetings rooms, conference room, core facilities, and equipment and storage rooms.

Planned Enrollment. Four to five full-time graduate students are anticipated to enroll per year over a typical five-year program matriculation plan. This would place 20-25 full-time graduate students in the program following the initial build-in and recruitment period.

New Extramural Funded Support. On January 9th, 2008, we learned that a program project in Medicinal Chemistry entitled ' Core Laboratory for Neuromolecular Production,' submitted to the National Institutes of Health is to be paid. The five-year, > \$3 million grant furnishes the PIs (Thompson, Gerdes, Esslinger) with substantial PhD level personnel, supplies and equipment to plan and bring to operation a core in medicinal chemistry and drug synthesis with an emphasis in neuroscience. Although no student lines were permitted in the request, Medicinal Chemistry graduate students can only benefit from an entire core facility aimed to enhance their intellectual, research and career goals. This NIH project is scheduled to be funded by late spring 2008. Also requested in this proposal was 0.5 FTE for an administrative assistant, which now provides the required match for a full-time person to assist with the Medicinal Chemistry program.

Planned Program Requirements.

- Completion of entrance requirements.
- Meet or exceed proficiency level.
- Completion of core curriculum with minimum GPA of 3.0
- Pass 4 of 7 written cumulative exams by the 4th semester in residence
- Successful defense of a written/oral out of field qualifying exam.
- Two public seminars; one in the candidate's field of expertise.
- Adequate progress in research as defined by grades in research classes.

- Adequate progress in research as defined by submission of at least one peer-reviewed manuscript.
- Write and defend Thesis/Dissertation

5. 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 are needed.

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.

Yes, there is need for administrative support and support for graduate students.

Administrative Support:

0.50 FTE @ \$33,4000 Salary: \$16,700 Fringe: \$8,600 (approx.)

Administrative support will be required to coordinate the graduate program, orchestrate teaching, and provide financial support, operations and internal grant coordination. The Department of Biomedical and Pharmaceutical Sciences currently has 3 Ph.D. and 3 M.S. programs with support for only a single administrative assistant. This is seriously insufficient. A 0.50 FTE is requested for staff administrative support to act as graduate coordinator and funds accountant. The remaining 0.5 FTE will come from extramural grants and contracts, which is appropriate to handle additional workload imposed from extramural grants. The remaining 0.5 FTE is already available.

Graduate Research/Teaching Assistants:

Salary: 4 @ \$24,000 = \$96,000 (plus fringe benefits @ \$9,600)
 Tuition: 4 @ \$ 12,800 (non-resident) or \$4,900 (resident) = \$51,200 to \$19,600 (min)
 Overall: salaries + fringe + tuition = \$156,800 (max) to \$125,200

Four graduate teaching assistants are requested to launch, maintain and sustain the Medicinal Chemistry MS/PhD program. Graduate assistants will have responsibility in teaching the Medicinal Chemistry lab courses (affiliated with 621/622) and/or assist with Pharmaceutics Lab, lecturing and/or demonstrations in the Professional Development courses (627-629), and grading/proctoring of Pharmacy professional classes, undergraduate classes (Use and Abuse 110) and Medicinal Chemistry graduate classes. Faculty in Medicinal Chemistry are expected to support additional graduate students, scientific staff, and post-doctorals through extramural funding. In a total enrollment year of 20 students, approximately \$137,500 would be institutional funds and \$412,500 would be extramural funds.

6. ASSESSMENT. How will the success of the program be measured?

Three areas are defined and will be used to measure program success including: (a) student output and placement, (b) curriculum and program breadth, depth and efficacy, and (c) scholarly/professional output and recognition.

(a) Student graduation rates/output and student placement. The target graduation rate based on initial enrollments is 60-75% for the PhD program and 80% for the MS program; approximately 4-5 total graduates per year are envisioned. Within five years of the program start, this goal will be raised to 75-85% (PhD) and 90% (MS). Program success in graduate numbers is based on many factors including enrollments, matriculation rates, funding support and the student

quality among other items. A second important measure of program success is the placement of graduates in highly competitive post-doctoral positions, entry-level industry and academic positions. Because the principal goal of the Medicinal Chemistry graduate program is job placement, we will seek a 90% or higher placement rate. [Note: it is difficult to define quality of job placement].

(b) Curriculum and program breadth, depth and efficacy. The Medicinal Chemistry program curriculum will be assessed every three years by an outside review team comprised of experts from academic, industrial and the business sector. Select employers of our graduates will be invited to visit and solicited for opinions on strengths and weaknesses of the UM Medicinal Chemistry graduate program. Overall, the programmatic strength resides in the quality of our graduates.

(c) Scholarly/Professional output and recognition. Key metrics to the program that will be monitored throughout the program lifetime and measures of success include the number and quality of presentations (oral/poster) at professional meetings or seminars, peer-reviewed publications, monographs, review articles, and books. These outputs when monitored chronologically directly correlate with program success. Activity and success in obtaining extramural funding (grants, contracts, etc.), developing business partnerships and collaborations, obtaining SBIR awards and starting commercial enterprises are also key measures of programmatic success.

The American Chemical Society (ACS; <http://www.acsmedchem.org/>) has a Division of Medicinal Chemistry that helps to define and evolve research and educational criteria, however, it is not an accreditation body. However, the ACS Division of Medicinal Chemistry executive and steering committee board members would serve as excellent program consultants.

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

Grad Standards Comm	Department of Biomedical and Pharmaceutical Sciences (UM)
Faculty	Department of Biomedical and Pharmaceutical Sciences (UM)

**Verification of review of the proposal by the affected departments and under units, such as:
(No signatures needed - just names of departments and date of approval)**

This proposal was reviewed and approved by the affected departments as follows:

Department: **__Biomedical and Pharmaceutical Sciences** Date: Sept 27, 2007

In addition the deans of the following Schools/Colleges reviewed and approved the proposal:

Dean of CHPBS: **Dean Dave Forbes** Date: Sept 27, 2007

The proposal was reviewed and approved by the Faculty Senate at the University of Montana
Date: Feb 14, 2008

[No outside consultants were employed for the development of this proposal.]