NEW GRADUATE DEGREE OR GRADUATE CERTIFICATE
FORM D

UNIT PREPARES IN QUADRUPLICATE
Route as indicated below under approvals. Return to the Registrar's Office once all signatures have been obtained.

Date: July 3, 2008

***Allow up to one year for the process to be completed for a certificate, and 18 months for a degree.**

RECEIVED
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RECORDS OFFICE

Dr. Deborah Helitzer
(Name of individual initiating Graduate Degree or Graduate Certificate)

Asst Dean for Research Education, 272-1887
(Title, position, telephone number)

Helitzer@salud.unm.edu ; bsgp@salud.unm.edu
(Email address)

Biomedical Sciences
(Department/Division/Program)

Note: Proposals for new graduate degrees or graduate certificates need to follow an approved format. Please call the Office of Graduate Studies and ask for an outline. Revisions of graduate degrees and some new certificates also may need state approval, depending on the extent of changes proposed. Please consult the Office of the Provost for advice prior to initiating this form.

Attach the following required documents:

1. Executive Summary.
2. Program Proposal (in the approved format).
3. Catalog Description (to include program curriculum).
4. Graduate Program Projected Costs (only for new degrees).
5. Library Impact Statement.

Does this new degree affect any existing program? Yes ☒ No ☐ If yes, attach statement.

Proposed date to admit new students: Term Spring Year 2009

Required Signatures:

Department Chair	Deborah Helitzer	Date 7-3-08
College Curricula Committee		Date 7/7/08
College or School Dean		Date 7-3-08
Dean of Library Services	Dirk Cave	Date 7-7-08
Office of the Registrar—Catalog	Elizabeth A. Barton	Date 07/28/08
FS Graduate Committee		Date 9/18/08
Dean of Graduate Studies		Date 18 Sept 2008
FS Curricula Committee		Date 10-3-08
Office of the Provost	Wynn M. Kelly	Date 10/13/08
Faculty Senate		Date
Board of Regents		Date

Additional Approvals for Degrees:

Board of Regents	Date
Council of Graduate Deans	Date
Academic Council of Higher Education	Date
Higher Education Department	Date
State Board of Finance	Date

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

PROPOSAL
Certificate Program in University Science Teaching in Biomedical Sciences

Need for the Program

Establishment of a formal science teacher training program will enhance the professional development of biomedical sciences graduate trainees by preparing them to teach in their disciplines in venues that range from community colleges to research universities and industry. The proposed Certificate Program in Science Teaching will address:

1. Local and national shortages in discipline-specific training and professional development in the art of teaching and communicating that enhances competitiveness of trainees for jobs in New Mexico and nationally,
2. Need for well trained and motivated teaching assistants in both the Biomedical Sciences Graduate Program (BSGP) and School of Medicine (SOM) undergraduate medical curricula,
3. Need for increased educational scholarship in the sciences, and
4. Development of local and state networks of faculty and student education scholars

Approval by the University of New Mexico

This proposal was approved in its preliminary form by the Biomedical Sciences Graduate Program Steering Committee and the Office of Graduate Studies. We now ask that the Faculty Senate, Office of the Provost, and Board of Regents approve this formal proposal and the other sections of Form D.

Academic Purpose and Objectives

The primary objective of the proposed certificate program is to enhance the ability and competitiveness of BSGP students to pursue careers that include teaching in the basic sciences. While not all BSGP students choose such careers, many others wish to enter the job market with credentials that document not only teaching experience but recognition of, and motivation for, educational innovation as well. Indeed, teaching is a component of faculty life at most academic institutions but nationally there are very few programs in the biological sciences that provide formal training in education and teaching. Furthermore, the communication skills gleaned in such programs are readily transferable to other aspects of academic careers, including research.

Specific objectives of the BSGP Certificate Program in University Science Teaching are to:

1. provide exposure to, and hands-on experience with, multiple approaches to teaching through workshops, discussions, and project design, thereby developing

creative and critical thinking skills that are also essential for successful research careers.

2. improve communication skills, including those in oral presentation, discussion leadership, articulation of goals, critical self-reflection, and giving and receiving feedback that are essential for effective teaching and highly transferable to research and other arenas as well.

3. provide a variety of opportunities to gain practical teaching experience. Such experience reinforces discipline specific and related knowledge and application and prepares the learner for academic and even industrial leadership positions where the ability to teach others is critical.

4. mentor the design and implementation of educational activities in areas of interest to individual students. Such mentor-trainee relationships foster greater interactions between both faculty and students and promote educational scholarship.

5. ensure that all activities leading to receipt of the Certificate are compiled in a professional and effective portfolio that can be updated as students' careers progress. The portfolio is designed to enable trainees to effectively compete for jobs in New Mexico and nationally.

The Curriculum

The curriculum for the Certificate in University Science Teaching is built on courses and workshops that are either well established or newly approved within the BSGP and the School of Medicine by the Faculty Senate. The Certificate requires completion of 15 credit hours at the time the Ph.D. is awarded through the BSGP and is in accordance with OGS guidelines. It should be noted that these elective credits represent a focus in educational development and teaching, and are included in (not in addition to) the 66 credits required for the Ph.D. degree. The 15 credits are distributed among required and optional coursework, participation in workshops, and design and implementation of an individual project. Documentation of these activities, along with a statement of teaching philosophy, will be assembled into a Teaching Portfolio toward completion of the program.

All existing coursework is already taught by the established and degreed faculty.

Required (11 cr) and Elective (4 cr) Courses; descriptions are included in the body of this proposal:

BIOM525 **Cell and Molecular Basis of Disease Journal Club; (4 credits required)**
V. Deretic, PhD and S. Rogers, PhD

BIOM540 **University Teacher Training; (2 credits required)**
A. Wandinger-Ness, PhD and S. Rogers, PhD

BIOM541 **Teacher Training Workshops; (1 credit elective)**
Deana Richter, MS, C. Timm, MD and SOM MD and PhD level faculty

BIOM542 **Teaching Assistant Practicum; (2 credits minimum required)**

Instructor of Record: S. Rogers, PhD and various graduate and medical course directors with PhD and MD degrees

BIOM543 **Independent Education Immersion for Teaching Scholars; (3 credits minimum required)**
Instructor of Record: S. Rogers, PhD and PhD and MD level faculty members involved in teaching or other educational endeavors with whom students choose to work.

BIOM544 **Human Anatomy for Basic Scientists; 4 credits (elective)**
Instructor of record: S. Rogers, PhD; BSGP students join medical students in the Human Structure, Function, and Development block of the Phase I medical curriculum; P. McGuire, PhD, Block Chair.

CJ583 **Teaching the Basic Course; 1 credit (elective)**
Instructors: Teaching Assistant Resource Center

EDPY572 **Classroom Assessment; 3 credits (elective)**
J.T. Parkes, PhD

EDPY510 **Principles of Classroom Learning; 3 credits (elective)**
T. Flowerday, PhD

LEAD529 **The Adult Learner; 3 credits (elective)**
A. Chavez, PhD

Workshops

Required and elective workshops are offered by the Teacher and Educational Development (TED) Office of the School of Medicine and the Teaching Assistant Resource Center (TARC). Workshop descriptions can be found at http://hsc.unm.edu/som/ted and http://www.unm.edu/~tarc/tarcmain.html.

Workshops required as part of BIOM540, University Teacher Training are "PBL Facilitation" and "The Art of Lecturing".

Justification of need for the University Science Teaching Certificate Program

Relationship to other programs. Nationally there are only a handful of training programs for trainees in the biological and clinical sciences that provide formal training in education and teaching. For the most part these programs are geared toward post-doctoral fellows rather than graduate students, e.g. federally funded programs at UCSF and Tufts. There are to our knowledge no programs similar to the one we propose in New Mexico or other states in the southwest region.

Special Features making UNM-SOM an appropriate place to initiate this program. The program within the BSGP provides an outstanding opportunity to begin such innovation at UNM because it capitalizes on 1) the excellence in educational training at the faculty level for which the SOM has gained an international reputation, 2) courses that are already in place and successful, 3) a demonstrated interest by BSGP students in acquiring teaching credentials, and 4) faculty with the knowledge and experience (in graduate, medical and undergraduate education) to mentor students through all phases of the Certificate Program. The Certificate Program in University Science Teaching is expected to serve as a model for other UNM graduate units whose students have interests in combining their

research specialty training with careers in teaching and has received interest from colleagues in Earth and Planetary Sciences.

The proposed certificate program is consistent with the missions of the University and the Health Sciences Center (HSC) to provide "comprehensive education, research and service programs" and "leadership in innovative, collaborative education", respectively. Not only will it enhance the ability of BSGP graduates to succeed in a competitive job market, it will also help attract top candidates to the BSGP by offering unique training opportunities and capitalizing on the designation of UNM main campus as a Research University by the Carnegie Foundation and of the HSC as a world-class leader in Medical Education Innovation.

Opportunities for advanced degrees. The certificate program is immediately available to trainees enrolled in the BSGP PhD program and will be earned concurrently with the Ph.D. degree. Future plans include making the program available to advanced degree holders such as postdoctoral fellows.

Resource Requirements

No new physical or financial resources are required to sustain the proposed program for the foreseeable future. In addition, we do not see a need to reallocate faculty responsibilities, beyond recruitment of mentors for students' individual scholarly projects (BIOM543). The existing Biomedical Research and Education Program Office, which oversees BSGP student progress, will provide the requisite administrative support.

Projected Enrollment

Based on our experience to date, we anticipate an average of 3-5 students/year at various stages of progress toward the Certificate, with 1-2 students/year completing all of the requirements.

	2007-2008	2008-2009*	2009-2010	2010-2011
Graduates	2	2	2	2
Total Enrollees	6	6	7	8
New	2	2	3	4

* If a K12 application for postdoctoral fellow training is successful the number of enrollees would be expected to increase by 2-4/year.

PROGRAM PROPOSAL

PROPOSAL
Certificate Program in University Science Teaching in Biomedical Sciences

I. Introduction

We propose a ***Certificate Program in University Science Teaching*** for doctoral students in the Biomedical Sciences Graduate Program. Our New Program Preliminary Review Outline has been approved by the Office of Graduate Studies and all requisite and elective courses have been reviewed by the Faculty Senate and are included in the catalog and schedule of classes. The preliminary proposal was co-initiated by Dr. Matthew Nyman of Earth and Planetary Sciences and included specialized courses in that department. That component of the preliminary proposal will now be pursued separately, although we still envision other interested departments may take advantage of the modular approach to the Certificate in Science Teaching and ease with which discipline specific elements may be incorporated.

The need for discipline-specific teacher training programs is several-fold. First, while numerous departments offer teaching assistantships, formal departmental training programs that prepare students for their roles in teaching courses are often lacking. In many cases, teaching assistant performance guidelines and expectations are also not clearly defined or monitored. Second, there is currently no formalized training at UNM to prepare graduate students or postdoctoral fellows in the sciences for careers that require teaching beyond the workshop offered by TARC. Despite this shortcoming, the UNM School of Medicine (SOM) has a longstanding tradition of excellence in educational training at the faculty level through the Teacher and Education Development (TED) office. In addition, courses for graduate students in Educational Psychology are offered through the School of Education and TA workshops are offered by TARC. It is our aim to capitalize on these strengths to build a model *Certificate Program in Science Teaching* for graduate students that may also serve as a template for clinical fellowship programs in the future. The establishment of such formal training programs is essential for UNM graduates and training programs to remain competitive and will enable us to apply for extramural funding in September 2008 to extend the offering to biomedical sciences postdoctoral fellows.

II. Program Description and Purpose

A. Primary and secondary purposes of the proposed program and external reviewer reports.

Establishment of a formal teacher training program will enhance the professional development of biomedical sciences graduate students by preparing them to teach in their disciplines in academic venues that range from community colleges to research universities. In addition, it may serve as a model for other UNM graduate units whose students have interests in combining their specialty training with careers in teaching. Nationally there are only a handful of training programs for predoctoral or postdoctoral trainees in the biological and clinical sciences that provide formal training in education and teaching. During the spring 2006 semester, Rogers and Wandinger-Ness, with

support from the Scholarship in Education Allocations Committee and the Undergraduate Medical Education Office, sponsored a presentation by Dr. Paula Lemons from Duke University. Dr. Lemons established a similar program for biology graduate students at Duke that was originally funded by the Pew Charitable Foundation Preparing Future Faculty Program, and she presented compelling evidence that trainees in biology benefit from a discipline-specific teacher training program through greater preparedness and competitiveness for jobs requiring excellent communication and/or research skills (Fleet, et al., BioScience 56: 1-7, 2006). During her visit, Dr. Lemons also met with the leaders of the proposed *Certificate Program in Science Teaching* to review our plans and subsequently provided feedback on the elements of the planned training program that have already been implemented as well as on the planned BSGP Certificate program (**Appendix item A1**). Her recommendations to include a mentoring program and require a teaching portfolio for the certificate have been incorporated into the present plan. In addition, the BSGP underwent an intensive self-study and external academic program review, which included a favorable assessment of the proposed Certificate in University Science Teaching (**Appendix item A2**). Thus, the implementation of the proposed program will not only better prepare UNM trainees in the sciences to enter a competitive job market, but it will also help attract top candidates to the BSGP by offering unique training opportunities and capitalizing on the designation of UNM main campus as a Research I University by the Carnegie Foundation and of the Health Sciences Center (HSC) campus as a world-class leader in Medical Education Innovation.

B. Consistency with the role and scope of UNM as set forth in its mission statement.

Central to the health care mission of the UNM HSC is: "*Providing Leadership in Innovative, Collaborative Education*" (http://hospitals.unm.edu/AboutUs/MissionVisionCoreValues.shtml). The proposed program will formalize training in education for BSGP graduate student trainees by capitalizing on the outstanding leadership in innovative and collaborative education at UNM HSC. This is perhaps best exemplified by the TED training program for HSC faculty that has led to outstanding and measurable outcomes in medical student education. Through interactions with TED and active participation of Rogers and Wandinger-Ness in TED training workshops, more than 30 BSGP students have benefited to date from taking part in the "Art of Lecturing" and "Tutor Training" workshops, 2 students have completed all requirements and 6 others are at various stages of completing the requirements for the proposed certificate. The impact of the training program at UNM is already measurable (**see Appendix item 6**). For example, one PhD student successfully competed with applications from UNM faculty and was recognized as an "*outstanding graduate student*" to teach a 2007 Freshman Learning Communities Class on Drug Development that was highly rated by the program director, Dr. Nossoff, and the students. Other trainees have implemented new 1 cr graduate level courses and participated in innovation in medical education or undergraduate Biochemistry education. The first group of BSGP students who have completed the workshops and a Teacher Training Class are just entering the job market. Two PhD students have already been offered teaching positions, one at Apollo College and the

other at New Mexico Highlands University, and a former post-doctoral fellow with Wandinger-Ness has accepted a position at California State University in Northridge. A third trainee graduating in summer 2008 is applying for NIH funded postdoctoral fellowship at Tufts and UCSF (IRACDA program; http://grants.nih.gov/grants/guide/pa-files/PAR-06-470.html#SectionIV) that emphasize both education and research excellence. As further trainees successfully assume jobs requiring discipline specific teaching, it will reflect positively on the reputation of the UNM HSC as a leader in educational innovation. In the meantime, the quality of teaching assistantships in the BSGP has increased markedly. Current measures of this success are in the form of evaluations from both the trainees and students enrolled in BSGP courses and one Phase I block for medical students.

At the University level, the proposed Certificate Program in Science Teaching clearly attends to the UNM mission statement that calls for "*comprehensive education, research and service programs*". Graduate students and postdoctoral fellows at UNM typically obtain a solid background in scientific research but, in general, few obtain formalized training in teaching. The proposed certificate program will provide an opportunity for graduate students and eventually fellows to obtain the formalized education component and therefore be better trained for succeeding in a very competitive job market. Secondly, we anticipate that some graduate students will fulfill certificate program requirements by working with pre-service teachers in the Natural Science Program and/or classroom teachers through workshops and research projects sponsored by the Science Education Institute of the Southwest (SEIS – A science education collaborative between the University of New Mexico and Sandia National Laboratory). These experiences will be beneficial in both directions, by providing important teaching opportunities for graduate students as well as useful learning and professional development opportunities for teachers. This component of the certificate program builds on the mission of the University by potentially enhancing the education of a wide spectrum of New Mexico teachers and students.

C. What is the institution's priority for the proposed program?

The BSGP is an interdepartmental program at the UNM HSC that includes four basic sciences and one clinical department in the SOM, as well as the College of Pharmacy and Lovelace Respiratory Research Institute. The proposed *BSGP Certificate in Science Teaching* is tailored to meet several of the HSC's goals. First, it is expected to aid in increasing recruitment of highly talented students and postdoctoral fellows to its programs. Second, it will increase the pool of qualified tutors and educators at UNM HSC, which is needed to support ongoing medical and graduate student teaching, as well as the new BA/MD training programs. Third, this innovative new training program will strengthen trainee readiness to enter a competitive job market, thereby enhancing the visibility of our unit through the success of its trainees. Finally, incorporating teacher training into basic sciences and clinical fellowship programs, through growth of the program, will facilitate joint educational activities between basic science and clinical departments in the SOM, including a new clinical translational research training program (CTSA, extramural application pending) and a planned K12 training grant for postdoctoral fellows with a 'minority student institution' focus (due September 2008).

Research and education are intimately linked activities, as much of science requires educating the public, peers, colleagues and students and most research training fellowships require evidence of training at least minimally in public speaking and presentation. Thus, the proposed BSGP science teaching certificate will support research priorities at the HSC in five signature research program areas: Brain and Behavioral Illnesses; Cancer Biology; Diabetes and Cardiovascular Disease; Environmental Health Science; Infectious Disease and Immunity (http://hsc.unm.edu/som/research/bsgp/signatureresearchprgms.shtm). A new clinical translational research training program for graduate students is being implemented with an extramural grant pending (final notification expected May 2008). Finally, the BSGP has many strong collaborations through the Integrative Graduate Education and Research Traineeships (IGERT) funded by the National Science Foundation that involve HSC and main campus faculty (PIs Osinski, Datye, Oliver among others). The certificate program will not be mandatory for all graduate trainees. However, due to the interdisciplinary and interdepartmental nature of the BSGP it is anticipated that graduate research training programs on both campuses will benefit, many of which hold external training grants.

D. Curriculum for proposed program

The Certificate Program in Science Teaching requires completion of 15 credit hours by the time the PhD is awarded and will not increase the total 66 cr hours required for the PhD, in accordance with OGS guidelines. The 15 credits will be distributed among required and optional coursework, participation in workshops, teaching experiences, and an individual project. Documentation of all certificate activities, along with a statement of teaching philosophy, will be assembled into a Teaching Portfolio and required for completion of the certificate program.

D1. Summary of skills and competencies developed through this program.

By participating in the Certificate Program in Science Teaching, students will gain:

- Knowledge about how people learn and methods of teaching and assessment, as well as opportunities to apply this knowledge in practice.
- Communication skills, including those in oral presentation, discussion leadership, articulation of goals, critical self-reflection, and giving and receiving feedback, that are essential for effective teaching and also transferable to their research careers.
- Practical teaching experience.
- Opportunities to contribute to educational innovation through the design and implementation of new courses or journal clubs, assessment tools, and problem based learning modules in their discipline of interest.

D2. Summary of required and elective credits. (Course descriptions follow)

Type of Activity	Required Credits (11) Representing all categories	Elective Credits (4) Chosen from one or a combination of categories
Courses and Workshops	CMBD Journal Club (BIOM525; 4 credits) University Teacher Training (BIOM540; 2 credits) **6 credits**	Human Anatomy (BIOM544; 4 credits) Teaching Assistant Resource Center Course (CJ 583; 1 credit) Teacher Training Workshops (BIOM541;1 credit) Ed. Psych. Courses (EDPY 472,/572, 510, or LEAD 529; 3 credits)
Teaching Practicum	Teaching Assistant Practicum (BIOM542) **2 credits**	Teaching Assistant Practicum (BIOM542); variable credits
Individual Project	Independent Education Immersion for Teaching Scholars (BIOM543) **3 credits**	Independent Education Immersion for Teaching Scholars (BIOM543; up to 4 additional credits)
Teaching Portfolio	Documentation of all activities described above plus a statement of teaching and education philosophy.	

D3. Course descriptions

D3.a. BIOM525: Cell and Molecular Basis of Disease Journal Club. Year long course (2 credits/semester) required of all first year BSGP students. It is a companion to the Cell and Molecular Basis of Disease (CMBD) Seminar Series, an interdepartmental program that hosts weekly speakers from outside UNM who have made important contributions to their research disciplines. Both it and the Journal Club

were inaugurated in 2000, with four basic science departments, the Department of Pathology, and the Cancer Center each contributing to the program financially and rotating administrative duties on a yearly basis. Students in BIOM525 present background information on each speaker in a format that fosters 1) development of oral and written communication skills, 2) increased breadth and depth of knowledge about a wide range or research areas, 3) effective listening to both peers and invited seminar speakers, 4) critical analysis of primary literature, and 5) participation in, and leadership of, scientific discussions with student peers.

D3.b. BIOM540: University Teacher Training. Six week class providing an introduction to the principles of how people learn and methods of teaching and assessment. In addition to group discussions of educational literature, students enroll in two workshops facilitated by the Teacher and Education Development (TED) Office in the School of Medicine: "The Art of Lecturing" and "PBL Facilitation", which provide didactic and practical experience with effective lecture preparation and delivery and tutorial group facilitation for problem based learning. At the end of the course students write a Statement of Teaching Philosophy, that serves as a "living document" as they advance in their careers, and design a course that incorporates both elements of this philosophy and educational approaches gleaned from course readings and discussions.

D3.c. BIOM541: Teacher Training Workshops. Workshops offered by the Teacher Education and Development (TED) Office and the Teaching Assistant Resource Center (TARC) emphasize skill development in education theory, curriculum development, student assessment, and giving and receiving feedback, often through hands-on experience. Workshops beyond the two that are included with BIOM540 may be taken for elective credit, with 15 hours of workshop contact time equal to one course credit. Credit is awarded based on written certification of successful completion of both didactic and practical portions of the workshops.

The workshops may be bundled as follows or by individual arrangement.
Option 1: Education theory and curriculum development

Workshop	Hours
How People Learn	3
Curriculum Development	4
PBL Case Development	4
TARC or additional TED workshops	4
Total Hours	**15**

Option 2: Assessment

Workshop	Hours
Constructive Feedback	3
Creating Test Items	4
Promoting Learning Through Formative Assessment	3
TARC or additional TED workshops	5

Total Hours	15

Workshop descriptions may be found at:
TED : http://hsc.unm.edu/som/ted
TARC: http://www4.unm.edu/grad/main/tarc/tarcevents.php

D3.d. BIOM542: Teaching Assistant Practicum. Teaching experience is critical for most faculty positions. BSGP trainees enrolled in this course earn course credit (and do not receive financial compensation) for serving as teaching assistants, with the number of credits determined by the number of contact hours. Arrangements for BIOM542 teaching assistantships are made on an individual basis. In addition to assisting the responsible faculty member, and depending on the type of course, BIOM542 students are expected to develop a teaching plan as described below.

Teaching assistantship positions include (but are not limited to) BSGP courses, Phase I School of Medicine tutorials and labs (**Appendix item A3**), Department of Biology courses (by special arrangement) and CNM Community College courses (by special arrangement). Teaching assistants enrolled in the course are expected to contact the faculty course director(s) of their choosing and develop a teaching plan in consultation with both the course director and BIOM542 instructors. The teaching plan should meet the needs of the faculty course director and focus on teaching skill development.

Assessment is based on regular meetings with the BIOM 542 instructors, evaluation by the faculty course director working directly with the teaching assistant, student evaluations, and a final report written by the TA that encompasses a description of accomplishments and self-evaluation. Sample evaluation forms for a representative course are attached **Appendix item A4**.

D3.e. BIOM543: Independent Education Immersion. Students enrolled in this course earn credit for completing an independent teaching or scholarly educational project. Possibilities include (but are not limited to) serving as an independent instructor, new course or case development, or assessment tool development. Arrangements for service as course instructor are made on an individual basis with interested faculty. Projects are tailored to students' individual interests and may focus on activities in their research disciplines.

D3.f. BIOM544: Human Anatomy for Basic Scientists. This course was taught for several years as an independent course for graduate students, but due to duplication of faculty effort, students now enroll in the Human Structure, Function, and Development block of Phase I of the SOM medical curriculum. The course runs for 10 weeks from early August to mid-October each year, and graduate students are expected to attend labs and lectures but not tutorials. The course is required of any student who wishes to be eligible for a teaching assistantship in HSFD in subsequent years and enables the trainees to develop cohesive training in teaching human anatomy (http://hsc.unm.edu/som/cbp/fellowship.shtml).

D3.g. Educational Psychology and Educational Leadership courses. These are offered through the School of Education* for 3 credits each and include:

- EDPY 472/572: Classroom Assessment
- EDPY 510: Principles of Classroom Learning
- LEAD 529: The Adult Learner

*Interested BSGP students must contact course instructors for permission to enroll.

II. Justification for the Program

A. Need

The BSGP has adapted goals and competencies based on recommendations by the American Association for Medical Colleges (**Appendix item A5**). The proposed certificate program will help us meet programmatic and national standards of training students to be discipline experts (goal 4), excellent communicators (goal 6) and good mentors, teachers and nurturers (goal 7). Active involvement in teaching is needed to: a) allow students to solidify general knowledge of biomedical sciences and enables training in complementary areas, b) provide transferable skills in oral presentation and discussion leadership, c) provide structured career development, d) enhance competitiveness for jobs.

As discussed below (II.B.Duplication), there are to our knowledge no programs similar to the Certificate Program in Science Teaching in New Mexico or other states in the southwest region. Numerous graduate programs at UNM offer teaching assistantships, but not formal training programs that prepare graduate students for careers that require discipline-specific teaching. A Science Teaching Certificate program will prepare BSGP students and as planned also postdoctoral fellows to be effective partners in the teaching mission of UNM and will increase their competitiveness (upon degree or training completion) for jobs requiring teaching or education skills. As a result of this program, students or fellows will be able to:

- Lecture or tutor small problem-based learning groups, and develop appropriately linked learning objectives and assessments
- Competently serve as a teaching assistant and/or as a primary instructor.
- demonstrate literacy and fluency in educational terminology
- Interact productively and dynamically in mentored relationships with faculty who have demonstrated excellence in education
- Contribute to educational innovation

Through the interactions implicit in achievement of these objectives, we expect that both graduate students, postdoctoral fellows and undergraduate medical students will benefit from the development of a vibrant community of peers interested in promoting educational as well as research excellence. One key aspect of the program involves partnering trainees with education mentors, faculty who have demonstrated excellence in the educational arena. A number of faculty who have demonstrated educational scholarship have already successfully trained students and fellows who have gone on to teaching/research careers (**Appendix item 6**). Upon approval, we will seek further

mentors within the UNM community (including Regents professors, Medical Education Scholars, teaching award recipients). It is envisioned that partnerships with other local and in-state teaching institutions would also be developed. For example, some BSGP students already teach at Central New Mexico Community College (CNM; formerly TVI Community College and the Albuquerque Technical Vocational Institute), through individual arrangements. The potential to involve other local and in-state institutions and fulfill a need for inter-institutional collaborations will be further developed as part of a K12 application.

The proposed program might also address a void in coordination of graduate-level teacher training activities across the UNM campuses. We envision that other interested departments will be able to utilize the organizational structure established by the certificate program within the BSGP as a model in the development of their own discipline specific programs. Its modular nature would allow students to tap into existing resources and courses, yet retain the flexibility of allowing individual participating departments to offer additional discipline specific courses. Thus, other UNM offerings could be linked into a collaborative network in the future as additional programs are launched.

Most entering students and postdoctoral fellows in biomedical sciences state their employment goal to be a faculty position in an academic institution. This type of position almost always carries with it teaching as well as research responsibilities. Industrial positions also often require putting on workshops or training sessions. As has become apparent since we began offering our teacher training course, at least 25% of our ~125 current trainees have demonstrated an interest in teaching. All students in the BSGP already benefit from taking BIOM525 as a PhD degree requirement. Enrollment in the course that is now BIOM540: University Teacher Training has averaged ~ 5 students/year and ranged from 3-12s students/year since its first offering in 2004. Thus, significant numbers of BSGP students receive the core didactic and practical foundations provided by courses associated with the proposed certificate program. Two students have completed all the requirements to earn a certificate, a third student will do so this summer and four others are at various stages in the program (also discussed in section II.A. above). We expect ~2 graduates/year will complete all certificate requirements, which represents approximately 10% of the total PhD and MD/PhD students admitted to the BSGP annually (18-22).

Approval of the proposed certificate program positions us to apply for an extramural K12 grant in September 2008 to offer the certificate program to postdoctoral fellows and would greatly advance scholarship in both research and education at UNM.

B. Duplication

The Certificate Program in University Science Teaching would be unique to both New Mexico and the southwest region. Although Universities in New Mexico include Colleges of Education (University of New Mexico, New Mexico State University, Eastern New Mexico University) or specific teacher training programs (Master's of Science for Teachers at New Mexico Tech), K-12 teaching is their primary focus. Outside the state

and region, four formal 'Preparing Future Faculty' (PFF) programs (http://www.preparing-faculty.org/default.htm#about) in the biological sciences were initially launched in the East (Duke Univ., Univ. S. Carolina) and Midwest (Univ. Cincinnati, Univ. Nebraska) with funding from the Pew Charitable Trusts, the NSF program and the Atlantic Philanthropies. Some institutions have since developed teaching certificate programs with similar elements as the original PFF programs (http://www.preparing-faculty.org/PFFWeb.Like.htm) though only two such programs are offered in the West. One at the University of California San Diego (http://www.ctd.ucsd.edu/programs/pfpf/index.htm) is offered in the Dept. of Physics and one at the University of California Santa Barbara (http://www.graddiv.ucsb.edu/academic/ccut/) is an institution wide program. Based on a search of the WICHE Western Regional Graduate Program Online Catalog (http://wrgp.wiche.edu/) no programs in teacher training are currently offered through WRGP exchange program. Thus, the proposed program will fill a local and regional void, providing graduate students with a unique resource and attracting top quality applicants to the BSGP.

Inter-institutional collaboration and cooperation is not applicable, though interaction might be developed through a planned K12 application.

C. Clientele and Projected Enrollment

1. Clientele

C1.a. Student population. Initially students in the program will be drawn from the BSGP, but as the program develops we expect to also enroll postdoctoral fellows and students and fellows from the medical curriculum and clinical fellowship programs. From outside the HSC, we anticipate attracting students from other science departments and eventually mathematics, engineering and possibly the humanities as a collaborative venture with interested departments.

Students enrolled in the BSGP are from New Mexico, a wide range of other US states, China, India, Middle Eastern and African nations. In 2007 the demographics of the BSGP was as follows:

Total #	Women	Men	White	Hispanic	Native American	Black	Foreign	Unknown
124	53%	47%	55%	16%	1.6%	3.2%	19%	0%

Their educational goals are to obtain a PhD or MD/PhD in Biomedical Sciences, with ~16% completing a research track MS.

C1.b. Qualifications for entry into the certificate program. BSGP students must be on the PhD or MD/PhD track, have successfully completed their first year of studies and passed the Qualifying Exam given at the end of that year. Students may decide to pursue a Certificate at any time after the end of the first year as long as they are in good academic standing.

C1.c. Equitable representation of students. The demographic representation of BSGP students is detailed section C.1.a., above. Any student in good standing in the BSGP may participate in the Certificate Program.

2. Projected enrollment.

We began awarding Certificates internally through the BSGP in December 2007. The students who received them had completed all requirements as set forth in this proposal for a transcripted program. Therefore, we have included student numbers for that year and base our projections on 1) our experience of student participation thus far, and 2) enrollment in BIOM540 (University Teacher Training), which gives us an indication of how many students plan to continue in the program (see also discussion in section II.A. above). All students have full-time status in the BSGP but participate in the certificate program on a part time basis as part of their overall PhD requirements.

Year	New Students	Continuing Students	# Completed Program
2007-08	2	6	2 (Dec. 07)
2008-09	2	7	2
2009-10	3	8	2
2010-11	4	8	2
2011-12	4	8	2

If the K12 application is funded we expect to enroll 2 fellows per year up to 5 total at any given time.

D. Institutional Readiness for the Program

We do not anticipate that any additional resources will be needed for this program.

1. Teaching faculty.

Drs. Rogers and Wandinger-Ness will lead and administer the BSGP Certificate Program and are actively involved in teaching the required Teacher Training course. Dr. Rogers is a faculty member of the Dept. of Cell Biology and Physiology and is an active participant in both the Undergraduate Medical curriculum and the BSGP. She is a Medical Education Scholar, served as co-director of the IMSD-MBRS program supported by an NIH grant for two years, and has previously developed an undergraduate research program in her department. Dr. Wandinger-Ness is a faculty member of the Dept. of Pathology and Assistant Dean of Graduate Studies. She directs the CRTC Microscopy Facility, is a former NSF CAREER Award recipient for scholarship in research and education, a Medical Education Scholar, and the recipient of a UNM Teaching Excellence Award. The areas in which the Certificate Program will increase Drs. Rogers' and Wandinger-Ness's workload are 1) development of additional TA opportunities, 2) overseeing students' individual projects and 3) recruiting additional faculty mentors.

The faculty involved in teaching the required and elective courses are currently as follows:

BIOM525	**Cell and Molecular Basis of Disease Journal Club; (4 credits required)** V. Deretic, PhD and S. Rogers, PhD
BIOM540	**University Teacher Training; (2 credits required)** A. Wandinger-Ness, PhD and S. Rogers, PhD
BIOM541	**Teacher Training Workshops; (1 credit elective)** Deana Richter, MS, C. Timm, MD and SOM MD and PhD level faculty
BIOM542	**Teaching Assistant Practicum; (2 credits minimum required)** Instructor of Record: S. Rogers, PhD and various graduate and medical course directors with PhD and MD degrees
BIOM543	**Independent Educational Immersion for Teaching Scholars; (3 credits minimum required)** Instructor of Record: S. Rogers, PhD and PhD and MD level faculty members involved in teaching or other educational endeavors with whom students choose to work (current mentors listed in **Appendix item 6**).
BIOM544	**Human Anatomy for Basic Scientists; 4 credits (elective)** Instructor of record: S. Rogers, PhD; BSGP students join medical students in the Human Structure, Function, and Development block of the Phase I medical curriculum; P. McGuire, PhD, Block Chair.
CJ583	**Teaching a Basic Course; 1 credit (elective)** Instructors: Teaching Assistant Resource Center
EDPY572	**Classroom Assessment; 3 credits (elective)** J.T. Parkes, PhD
EDPY510	**Principles of Classroom Learning; 3 credits (elective)** T. Flowerday, PhD
LEAD529	**The Adult Learner; 3 credits (elective)** A. Chavez, PhD

Faculty involved in medical education (Bear and McGuire) have already agreed to serve as co-tutors for BSGP trainees to gain practical experience. Dr. David Bear is a Medical Education Scholar, former chair of Cell Biology and Physiology, Block leader of the Genetics and Neoplasia block in the medical school curriculum and current Dean of Undergraduate Medical Education Admissions. In addition to his administrative responsibilities, he is an active, extramurally funded investigator. Dr. Paul McGuire is Chair of Cell Biology and Physiology, block leader of the Human Structure, Function, and Development block in the medical school curriculum and heads an active research group studying angiogenesis.

Other course and workshop instructors include Drs. Deretic (CMBD J. Club), Drs. McGuire and Rogers (Human Anatomy for Basic Scientists), Dr. Craig Timm, Deana Richter and other faculty partners in TED (education workshops). Dr. Deretic is Chair of Molecular Genetics and Microbiology and an internationally recognized, extramurally funded investigator. Dr. Timm is a cardiologist, Medical Education Scholar and Associate Dean for Undergraduate Medical Education. Deana Richter holds an MA and

has extensive experience in communication, adult education, and organizational training and development, including teaching in the UNM Communication Department for seven years. She is the Associate Director of TED, under the auspices of Dr. Timm. The TED office workload will be increased as more students participate in workshops. This may require the development of additional workshops and recruitment of additional faculty to lead the workshops. Rogers and Wandinger-Ness already participate as workshop facilitators.

Dr. Jay Parkes will be the main contact in the College of Education to facilitate the education courses that are part of the proposed program. Dr. Parkes teaches two of the three education courses (EDPY 472/572 - Classroom Assessment and EDPY 510 - Principles of Classroom Learning) and will be assisting us in integrating LEAD 529/OLIT 561 - The Adult Learner into the program. Dr. Parkes has over 8 years of teaching and research experience at UNM including coordinator of the Education Psychology program and graduate advisor.

It is anticipated that additional faculty will be involved as mentors and as supervisors of independent study projects in education. The current mentor list, **Appendix item 6**, will be expanded focusing on faculty who have been recognized as Regent's Professors, Medical Education Scholars or awarded teaching excellence awards.

2. Library and other academic support resources. Student Learning Support, directed by Cheri Koinis, will be utilized in addition to library and CIRT services.

3. Physical facilities. These are adequate.

4. Equipment and technological resources. Students will need to have access to SMART classrooms equipped with digital projectors and internet accessible computers. Such rooms are currently available on the UNM HSC campus and a new education building is nearly completed. TED has capabilities for taping lectures, and small rooms with two way mirrors for tutor training.

5. Operating resources. None are required in addition to faculty and staff already in place.

6. External facilities. None will be needed.

E. Projected Cost of the Program

1. New costs for program start-up. As stated in the previous section, no new faculty, library resources, or additional facilities or equipment will be needed to begin the program or sustain it during the first five years.

2. State support.

TA positions for credit or pay are already available through the BSGP for teaching graduate and medical student groups (**Appendix item A3**). Paid positions are supported by the Executive Vice President for Research & Dean SOM, Dr. Paul Roth. In addition, BSGP students have taught for the Dept. of Biology and vice versa when slots are available. Students may elect to receive course/independent study toward their certificate (1 cr/15 hr classtime) credit in lieu of monetary payment. Some of these credit hours may also substitute for elective credit hours toward their PhD degree. BSGP students are supported throughout their training period by GAs provided by the SOM Dean's office in their first year and their research mentor in subsequent years.

3. Other support.

The BSGP does not receive direct return of formula funding, therefore, growth of the program will depend on seeking external funding and support from the Executive Vice President for Research & Dean SOM. We will request funding for 1) additional TAships, 2) external review visits, 3) seminar speakers, 4) partial administrative and/or faculty salary commensurate with program growth.

The TED office is not charging tuition when graduate students take the workshops, though depending on the enrollment we expect to require a course fee to cover the cost of training materials. Currently, Wandinger-Ness and Rogers participate as trainers in the workshops to help compensate for TED increased workload. There is a course fee associated with the Human Anatomy course, the fee for which is paid by the student's department.

F. Quality of the Program

The quality of the proposed program is ensured by the high standards that have gone into the design and implementation of the BSGP and its associated courses. Admissions criteria have been established and reviewed over a period of years, and the BSGP as a whole has undergone extensive external reviews with the proposed Certificate Program in Science Teaching favorably reviewed (**Appendix items A1-A2**). Drs. Rogers and Wandinger-Ness are documenting the progress of each student through the program and, in addition, will track their subsequent careers to determine the impact the program has on 1) the types of professional positions they choose, 2) their success in competing for those positions, and 3) their approaches to teaching based on personal statements.

Accreditation is not required for the proposed *Certificate Program in Science Teaching* to have value for its participants. Meeting the requirements for TEAC accreditation could best be achieved after the program has been implemented and has developed a track record of graduates (~2-5 years). Based on a review of U.S. Dept. of Education approved accrediting bodies (www.ed.gov/admins/finaid/accred/accreditation_pg8.html#te) for Teacher Education, there are only two organizations; the National Council for Accreditation of Teacher Education (NCATE) and Teacher Education Accreditation Council, Accreditation Committee (TEAC). Based on review of the NCATE unit standards guide p. 5 (http://www.ncate.org/institutions/standards.asp?ch=8), there is no accreditation

provided for "the Professoriate".

Per email correspondence with Frank Murray at TEAC (http://www.teac.org/accreditation/index.asp), there is a possibility that TEAC could provide accreditation for the program. Briefly, TEAC would ask for evidence-based demonstration that the certificate program produces competent teachers in the life sciences at the college level. Furthermore, we would need to show the reliability and validity of the evidence and whether the evidence was used to improve the certificate program and monitor its quality. Finally, commitment of the University of New Mexico to the certificate program would have to be demonstrated.

Dr. Lemons at Duke and Ms. Deana Richter in the Teacher Education Development office have also been consulted. Dr. Lemons has deliberately opted not to seek accreditation for her program to avoid the constraints that are often imposed by accrediting bodies and may not be applicable to trainees for the Professoriate.

G. Assessment of Operations and Impact

1. Program operations, progress of students, and program completion rates are monitored by Drs. Rogers and Wandinger-Ness. Due to the relatively small size of the program this is done on an ongoing basis and involves frequent communications with students and documentation of these communications. The program is also under the oversight of the BSGP faculty steering committee consisting of 13 faculty representing the 6 participating departments and programs who track the academic progress of all students in the program on an annual basis. Students must be in good standing in their degree program to be eligible for the Certificate Program.

2. Evaluations by students in all courses included in the program occur at the end of each course and are used to modify teaching strategies and/or desired outcomes. In courses such as the CMBD Journal Club or University Teacher Training, both objective and subjective measures are utilized. For other courses, such as the Teaching Practicum, students are asked to write a critical self-reflection as well as evaluate the quality of mentoring they received. In the latter case, evaluations of students by faculty mentors are also solicited. Information gleaned from students after completion of the program will be compiled and used for overall program review.

3. External Review by education experts. We have already sought the advice and review by Dr. Lemons and the Certificate Program was included in the 2006/2007 Academic Program Review. It will continue to be evaluated in all future Academic Program Reviews of the BSGP.

H. Administrative Responsibility for the Program and Institutional Commitment

1. Governance structure of the program.

The University Science Teaching Certificate Program in the BSGP will be under the governance of the Office of Research in the SOM, led by Senior Associate Dean, Richard Larson. Dr. Angela Wandinger-Ness, as a Dean's appointee in the Office of Research, is currently Assistant Dean of Graduate Studies for the UNM HSC and

responsible for the leadership of the BSGP and oversight of the MD/PhD and the postdoctoral training programs. In addition, there is a BSGP steering committee constituted by two faculty members from each participating department or program and two student representatives. Curriculum changes are initially reviewed and approved by the BSGP steering committee. The preliminary proposal for this certificate program was approved by the BSGP Steering Committee, the SOM Senior Associate Dean, OGS Dean Wohlert and the Provost.

2. Administrative Support.

Administrative support for the University Science Teaching Certificate Program is provided by the Biomedical Research and Education Program office. The office is under the purview of Sr. Associate Dean Larson and Assistant Dean for Graduate Studies. The team consists of a Program Manager, Ignacio Ortiz; two Program Coordinators, Mary Fenton and Karen Gomez and two work study students. The BREP staff are responsible for BSGP admissions, student progress, faculty steering committee and program director support, course scheduling and teaching support. Should the program grow substantially and if we are successful in our K12 application an additional administrator will be hired at 0.5 FTE.

Appendix Materials A1-A5

A1) Lemons Assessment
A2) Academic Program Review Assessment Excerpt
A3) Teaching Assistantship Options
A4) Sample Course Evaluation Forms
A5) Educational Objectives PhD in Biomedical Sciences
A6) Current Education Mentors

A1) Lemons Assessment:

Dr. Paula P. Lemons
Assistant Professor of the Practice
Department of Biology
Duke University
Box 90338
Durham, NC 27708

May 11, 2006

Dr. Angela Wandinger-Ness
Professor, Department of Pathology
Asst. Dean for Graduate Studies, Biomedical Sciences Graduate Program
University of New Mexico School of Medicine
Cancer Research Facility, 225A
wness@unm.edu

Dr. Sherry Rogers
Associate Professor, Department of Cell Biology and Physiology
University of New Mexico School of Medicine
149 Basic Medical Sciences Building
srogers@salud.unm.edu

Dear Angela and Sherry,

Thank you for the opportunity to review the proposed Teacher Training Certificate of the Biomedical Sciences Graduate Program at the University of New Mexico and to offer feedback based on our conversations, your SEAC proposal, and your draft New Program Preliminary Review. I am enthused that you are addressing the critical and well-documented need to broaden graduate student training by offering preparation for teaching. The plan you have outlined for your program is solid and should offer an excellent introduction to graduate students about teaching and learning issues. I include below some general and specific comments. If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Paula P. Lemons

General Comments:

- I commend your for developing a very strong 5-week Teacher Training Course. This excellent course provides pedagogical training in standard day-to-day activities of teachers: "The Art of Lecturing," and "Assessment and Feedback." It also offers

instruction in topics that are foundational to a course that is measurably good: "How People Learn and Objective Writing." Finally, it offers students detailed instruction in problem-based learning - a pedagogical innovation for which UNM SOM is well known. The assignments for Teacher Training complement the course schedule by giving students practice in thinking through a course from designing objectives to assessing if students have met these objectives. The strength of this course derives from your expertise – both UNM Medical Education Scholars with lots of relevant teaching and administrative experience – and your collaborations with the Office of Undergraduate Medical Education.

- I suggest that you think a bit more about and then more clearly state the objectives of the program. Exactly what do you hope the students will know and be prepared to do upon their completion of the program? In your New Program Review, you say the following about expected learning outcomes, "[The] program will prepare BSGP graduate students to be effective partners in the teaching mission of UNM-SOM programs and will increase their competitiveness, upon degree completion, for jobs requiring teaching or educational skills." In the opening paragraph of the New Program Review, you suggest that the program will provide TA training for BSGP courses, preparation for teaching careers, and preparation for faculty positions at diverse types of institutions (community colleges to research universities).

  You can break these thoughts and ideas down into learning objectives, just like you would for a course. For example, you could say certificate students will:

  (1) Demonstrate competency as TAs.
  (2) Gain basic teaching skills: lecturing, PBL tutoring, objective and assessment design.
  (3) Understand the various dimensions of faculty life at different types of academic institutions.

  Doing this will give your program a sharp focus and a guide for assessment. I know you're both in the habit of doing this for your own courses, so I'm sure you see the payoffs.

- If indeed you want to make preparation for faculty life at diverse academic institutions a focus of your program (although it doesn't necessarily need to be), you should address the question of how to expose students to different types of academic institutions?

  You should also consider how to help students gain teaching experience that will be relevant for the academic job market? When I say relevant teaching experience, I mean independent teaching experience. I know independent teaching at UNM SOM may be impossible for graduate students, but it would be possible to give students teaching experiences that involve one or more of the following: mentoring by a trained faculty member (could you link mentorship with the Medical Education Scholars program to ensure a common foundation for all mentors?), the opportunity to lecture, lead class discussions, or facilitate PBL groups, design exams/assessments, and offer feedback on them. Most of these skills would be highly valued by potential academic employers. Your

plans for the TA Experience component of the program would be greatly enhanced by spelling out the expectation that TAs will receive these types of experiences.

Specific Comments:

These comments are listed in the order in which they are found in the New Program Review.

1. Program Description, part a. Should you add the phrase "college teaching" or something equivalent to distinguish your program from programs that certify students for K-12 teaching?
2. Program Description, part a. You might add to the end of this paragraph that you are already in conversation with members of the Earth and Planetary Science department who are interested in developing a Science Education certificate.
3. Program Description, part d. I took a look at the CASTL TARC workshops and agree that these would intersect nicely with your program. The Teacher Training course that you offer is much more sequential and foundational, but the CASTL workshops provide nice selected topics for students to get in on if they choose.
4. Program Description, part e. It is not clear how the SERP fits in with your program. Also, does UNM care about national context – e.g., PFF and schools that offer it, our certificate program at Duke?
5. Student Characteristics, part e. It would be good to make this more clear, but I imagine this will be possible if you're able to further clarify the TA experience section as I discussed in the General Comments section.
6. Curriculum Plan, part a. Is there a credit requirement for a certificate program at UNM? Do students need just 6 credits or more? Do credits even matter?
7. Curriculum Plan, part a. CMBD. I see the value of this course, but it's relevance to your Teacher Training Certificate is not obvious. This was another place where I saw that clarifying your objectives would contribute to clarifying why you've chosen particular components of the program, like this one.
8. Curriculum Plan, part a. Individual project. I like the idea of providing options here. Could you add to the examples here the option of mentorship by a faculty member at a partner institution (if you stick with the faculty prep objective)?
9. Curriculum Plan, part d. Based on my discussions with Marcy Osgood, I think a powerful assessment tool, particularly regarding self-reflection, would be to have students do online journals that you (and/or other faculty mentors) could read and respond to. These would also be a source of data for program research and assessment.
10. Human Resource Plan, c. Based on my experience, you'll need and want some administrative support for this program. I strongly encourage this so that you have the time to do the visioning and strategic planning for the program without getting bogged down in administrative details. This has been a struggle for me.
11. Do you need a budget?

A2) Academic Program Review Assessment Excerpt (relevant text in bold):
Written by Review Panel Members: Dr. L. McManus, Professor Pathology, Univ. Texas San Antonio; Dr. D. Petersen, Professor Pharmaceutical Sciences, Univ. Colorado HSC; Dr. T. Reh, Professor Biological Sciences, Univ. Washington SOM; Dr. R. Yeo, Professor & Chair Psychology, Univ. New Mexico.

"Overview

BSGP students pursuing a MS, PhD, or combined MD/PhD degrees enroll in core courses contained within the first year curriculum. The first (Fall) semester of the curriculum consists of 2 core courses, BIOMED 507 (that provides a comprehensive knowledge base in cellular and molecular biology) and BIOMED 508 (that provides students with the basic skills of reading and critically evaluating the scientific literature; a major component of the literature is focused on the molecular basis of diseases). Through these courses, students are also introduced to the basic concepts of hypothesis development and testing. All students that successfully complete these courses transition to second semester "core selective" courses focused on their individual interests which may include cancer biology, neurobiology, physiology, immunobiology, molecular genetics and genomics, pharmacology as well as molecular toxicology. Concurrent with coursework, students complete three research rotations with the primary goal of identifying a research mentor by the end of the Spring semester. The selected mentor and research site are from one of six research divisions or affiliated extramural partners, *i.e.*, Biochemistry and Molecular Biology, Cell Biology and Physiology, Molecular Genetics and Microbiology, Neurosciences, Pathology, Toxicology and Environmental Disease, and the LRRI and NL. Once a student identifies a laboratory where their research will be conducted, additional selective courses in their area of interest are taken. **Should students desire experience in developing teaching skills, they can enroll in a BSGP-organized program designed to provide experiential instruction in teaching science at the university level. The award of a certificate documents successful completion of this instructional teaching program.**

Strengths

1. All BSGP students are required to complete specified core courses thus ensuring development of a uniform knowledge base in the subject areas considered to be important by the BSGP faculty.
2. Advanced students unanimously agreed that the core courses prepared them for the qualifying examination which is administered at the end of the first year.
3. Students also commented that the combination of research rotations and selective courses taken during the second semester exposed them to relevant subject areas and allowed them sufficient time to identify laboratories consistent with their research interests.
4. **The Certificate in University Science Teaching program is extremely valuable and equips students with a knowledge base and experience that will increase their marketability in an academic setting. "**

A3) Teaching Assistant Opportunities Grid for Fall 2006 and Spring 2007. TAships in table may be monetarily compensated or developed for BIOM542 course credit, see HFSD example.

Course # and Name	Contact Person (Name, email, phone)	Semester (F or Sp)	Brief description of student duties	Time Commitment (hours per week, total number of weeks)	Student Qualifications (education background and teaching skills required)
FALL					
BIOC 423 Introductory Biochemistry	Anderson 2-8516 wanderson@ salud.unm.edu	Fall 2006	Facilitate 2 small online cooperative learning tutorial groups; 1 scheduled office hr per week; participate in exam construction, grading and evaluation, Attendance at lecture is not required	8 hrs/wk, 16 weeks	Grade of A or B in BIOC 446 or equivalent course and an interest in science education. Opportunity exists to present lectures and receive feedback on those lectures.
Human Structure, Function and Development* Phase I UME Curriculum	Paul McGuire 2-9537 pmcguire@salud.unm.edu	Fall 2006 **Aug. 7-25**	Attend all scheduled anatomy lab sessions for the first 3 wks of the block; Assist in lab exam preparation and grading	12 hrs/wk, 3 weeks	Prior TA in this block or having taken the spring Graduate Anatomy course
Human Structure, Function and Development* Phase I UME Curric	Paul McGuire 2-9537 pmcguire@salud.unm.edu	Fall 2006 **Aug. 7-Oct. 21**	Attend all scheduled tutor meetings and Co-tutor with an experienced faculty member	7hrs/ wk, 9 weeks	Tutor training course or prior tutoring experience
*NOTE: TA positions associated with HSFD are also available for course credit in lieu of pay. See course description at end of grid.					
SPRING					

BIOM 509 Neurobiology	D. Partridge 2-8815	Spring 2007	Attend all lectures, run a weekly review session, attend and help evaluate student oral presentations, preview & proctor exams	6 hrs/wk, 15 weeks	Prior BIOM 509 and interest In Neuroscience
BIOM 510 Graduate Physiology	N. Kanagy nkanagy@salud.unm.edu 272-8814	Spring 2007	Attend all physiology lectures, assist in small student groups, prepare and lead review sessions prior to each exam, proctor and grade exams	8 hrs/wk, 16 weeks	Prior BIOM 510 and interest in physiology
BIOM 514	R. Rubin rlrubin@salud.unm.edu, 2-4640	Spring 2007	Grade weekly problem sets, midterm and final exams; Attend weekly lecture (1.5 hrs); Facilitate small group discussions (1.5 hrs.)	8 hrs/wk, 14 weeks, + 2 exams Total: 110 hrs	Passed BIOM 514 with grade of A; Interest in immunology
BIOM 515	Rob Orlando 2-5593 rorlando@salud.unm.edu	Spring 2007	Attend all Cancer Biology sessions, lead small group learning sessions, assist instructors with office hours and grading exams/final reports.	6 hr/wk, 16 weeks	BIOM 507/508 series is required. Have previously taken BIOM 515; experience leading small group study sessions will have preference.
BIOM 516 Molecular Genetics and Genomics	S. Ruby sruby@unm.edu 2-5830	Spring 2007	Help run computer labs, help set up and test any software needed for labs, test run labs, assist in grading assignments and oral presentations	10 hrs/wk, 15 weeks	BIOM 516 or equivalent is desirable, must be knowledgeable of Windows & Excel, familiarity with linux/unix & MatLab is desirable

BIOC 423 Introductory Biochemistry	Anderson 2-8516 wanderson@ salud.unm.edu	Spring 2007	Facilitate 2 small online cooperative learning tutorial groups; 1 scheduled office hr per week; participate in exam construction, grading and evaluation, Attendance at lecture is not required	8 hrs/wk, 16 weeks	Grade of A or B in BIOC 446 or equivalent course and an interest in science education. Opportunity exists to present lectures and receive feedback on those lectures

ADDITIONAL TEACHING ASSISTANTSHIP OPPORTUNITIES EXCLUSIVELY FOR BIOM 542 COURSE CREDIT. Prerequisites for enrollment are completion of the School of Medicine's Tutor Training workshop or completion of Biomed 540.

BIOM 505F-006 (call #11155) – Tutorial Assistant– Human Structure, Function and Development
Dates: August 7-October 21, 2006
Description: 2 credits. Gain experience as a facilitator in problem-based learning sessions of the Human Structure, Function, and Development Block of the Phase I medical curriculum. The Block runs from Aug. 7 to Oct. 21 but you may choose to assist in one of three separate 3-4 week sessions within the above timeframe. Requirements are to 1) work with an experienced tutor in two 3-hour sessions/week, 2) attend one tutor meeting each week, 3) write student evaluations, and 4) write a 2 page self-reflective paper on your experience. Contact Drs. Paul McGuire and Sherry Rogers 272-0007 or by email pmcguire@salud.unm.edu, srogers@salud.unm.edu

BIOM 505A-001 (call #11152) - Special Topics - Teaching Medical School Human Genetics and Neoplasia
Dates: October 23 - December 1, 2006
Description: 4 credits. Hours: Most weekday mornings 8-12. Students will learn how teach in a medical school problem-based learning environment and will co-tutor with members of the faculty in the School of Medicine's Genetics and Neoplasia block. There will be 5-6 contact hours per week on Monday and Thursday mornings, as well as tutor meetings on Thursdays at 12 noon, followed by a special one-hour meeting at 1 PM for students enrolled in the course to talk about their experiences as tutors. Students may have to attend at least some lectures on the rest of the mornings to be able to keep up with material necessary for functioning as a co-tutor. Contact Instructor David Bear at 272-8520 or by e-mail at dbear@salud.unm.edu; Professor of Cell Biology & Physiology, Co-Chair Genetics and Neoplasia block.

A4) Sample Evaluation Forms used for TA feedback. By soliciting TA self assessment, as well as feedback from the education mentor and students in the course a comprehensive view of strengths and weaknesses can be provided to education trainees. Sample feedback questions follow.

TEACHING ASSISTANT SELF ASSESSMENT
Human Structure, Function, and Development Labs
Fall, 2005

Please address the following questions and return copies to your HSFD lab mentor and to Sherry Rogers. Thank you!

1. In general, did you feel competent to discuss the course material with the students and to address their questions?

2. In general, did you feel that your help was appreciated by the students?

3. Did you discuss course content and/or teaching strategies with your faculty mentor? If so, was this helpful to you?

4. If you attended lectures did these help with your lab teaching?

5. Please add any comments and suggestions that might help us to improve the HSFD TA program.

FACULTY MENTOR EVALUATION OF TEACHING ASSISTANTS
Human Structure, Function, and Development Labs
Fall 2007

Faculty member:
Teaching Assistant:

Please provide feedback on the following to the TA you mentored, and please provide a copy of this evaluation to Sherry Rogers. Thanks for your help!

1. Did the TA appear to be comfortable interacting with groups of students (or did this "comfort level" increase with time)?

2. In general, did the TA have an adequate grasp of the material?

3. Did the TA utilize your expertise on teaching strategies and/or course material?

4. Did you observe particular strengths?

5. Did you observe particular areas that could use improvement?

6. Any other feedback for this TA or for the "organization" of the developing TA program?

STUDENT EVALUATION OF TEACHING ASSISTANT
Human Structure, Function, and Development
Fall, 2007

Teaching Assistant:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I had frequent interactions with this TA.	1	2	3	4	5
I found him/her willing to discuss course material with my dissection group.	1	2	3	4	5
I found him/her willing to help with dissections when necessary.	1	2	3	4	5
In general, his/her knowledge of the material was sufficient to address my questions.	1	2	3	4	5

Please add any additional feedback that would be helpful to this Teaching Assistant. Your comments will be very valuable to the development of his/her teaching career. (Space provided for comments below)

A5) Educational Objectives and Competencies for PhD in Biomedical Sciences

(Competencies 4, 6, and 7 that are targeted and enhanced through the proposed Certificate Program are in **Bold**)

BSGP Goal: To help trainees achieve the requisite competencies that will enable them to become effective educators, skilled experimentalists and leaders who are prepared to take up careers in biomedical science, nanotechnology and translational science.

Learner Centered Goals and Competencies:

	Goal and Objective*	Competency
1	Competent, skilled experimentalists	Set up and conduct experiments that produce tangible results. Operate equipment and execute methods required for project completion.
2	Problem solvers	Diagnose, evaluate, test and determine how to overcome technical and practical problems.
3	Critical and independent thinkers	Analyze, critique and dissect biological problems. Formulate new hypotheses based on available data, devise strategies for hypothesis testing, and organize and analyze data for publication.
4	**Expert in the field with both depth and breadth of knowledge**	**Explain and illustrate discipline-specific subject matter.** Interpret and evaluate primary literature.
5	Leaders	Share experiences and serve as a role model for others. Take on responsibility for project progress and completion and publication of results.
6	**Excellent communicators**	**Succinctly explain and summarize state of knowledge in field, interpretation of results and conclusions in oral and written form.**
7	**Good mentors, nurturers and teachers**	**Advise and nurture beginning graduate students and undergraduate students in research and education. Teach undergraduate, beginning graduate or medical students as teaching assistant, co-instructor or instructor.**
8	Organized administrators	Organizational, multi-tasking & management skills, ability to delegate and interact well with others
9	Exemplars of high ethical standards	Demonstrate working knowledge of responsible conduct in research. Critically reflect on ethical problems.
10	Collaborators and team players	Demonstrate 'people' skills. Work cooperatively as part of interdisciplinary teams.

*Adapted to BSGP from: Self-Assessment of Graduate Programs in the Biomedical Sciences Narrative Guide and Companion Survey Instruments
Report of the Task Force on Benchmarks of Success in Graduate Programs AAMC GREAT Group September 2000 (full report available in PDF format on the GREAT website http://www.aamc.org/members/great/start.htm)

The core curriculum has been specifically revised and designed to help learners achieve the stated competencies. Educational competencies may be enhanced through an optional Teacher Training Certificate program (new).

Methods of Assessment.

Students are given mileposts* for each of their two-three years in the MS or four-six years in the PhD program. There are three major examinations that students must pass to remain in the program.

Qualifying Examination: BSGP mandated oral examination that assesses oral presentation skills, knowledgeability about core subject materials and hypothesis and scientific reasoning skills. (PhD and MD/PhD students, MS students only if petitioning to transfer to PhD program)

Comprehensive Examination: University requirement for advancement to candidacy. Oral and written examination that assesses student's ability to plan, design and execute an independent, discipline-specific research project. Focus is on oral and written presentation skills, acquisition of preliminary data to demonstrate feasibility, tractability in proposed time, and novelty of research plan. (PhD, MD/PhD students only)

Dissertation Defense: University requirement for completion of degree. Oral defense of written thesis. The examination assesses the satisfactory completion of an independent research project. It is expected that elements of the dissertation will also be submitted and/or published in peer-reviewed journals. (All students, MS, PhD, MD/PhD)

Teaching Portfolio: Required for completion of Teaching Certificate (see separate section).

A6) Current Education Mentors

Students or fellows who have not yet

Faculty Education Mentor	Project	Graduate Student/Fellow	Current Status
Angela Wandinger-Ness, PhD & Assist. Dean for Graduate Studies, Medical Education Scholar, Teaching Award Recipient, Professor Pathology	Signaling and Trafficking Journal Club for Graduate Credit	Mary-Pat Stein (fellow)	Completed post-doctoral training, Assist. Prof. California State University, Northridge
Angela Wandinger-Ness, PhD & **Sherry Rogers**, PhD & Assoc. Professor Cell Biology and Physiology, Medical Education Scholar, Director Human Anatomy Lab	Completed numerous courses and workshops that are now offered as part of certificate program. Served as TA and tutor.	Francisco Renteria (PhD student)	PhD Fall 2006, Program Director Apollo College
Joel Nossoff, Director, Freshman Learning Communities	FLC class on Drug Development	Tapan Nayak (PhD student)	Completed certificate program and PhD Fall 2007, Postdoctoral fellow NIH
Paul McGuire, PhD & Chair Cell Biology and Physiology, Block Chair Human Structure, Function and Development; **Sherry Rogers**,	Tools for increased Learning and Comprehension of Anatomy	Sheldon Jordan (PhD student)	Completed certificate program, declined job offer at Highlands Univ. Spring 2008, PhD expected Summer 2008.

PhD			
Marcy Osgood, PhD & Assist. Prof. Biochemistry and Molecular Biology, PI BRIDGES training grant	Problem Based Learning for undergraduate Biochemistry students	Kelly (Miquella) Chavez (PhD student)	Certificate in progress, applied to IRACDA* fellowship programs at Tufts and UCSF
Gary Rosenberg, MD & Chair Neurology	Brain and Behavioral Illness Journal Club	Espen Walker (PhD student)	Certificate in progress
Jac Nickoloff, PhD & Professor Molecular Genetics and Microbiology and **David Bear**, PhD and Professor Cell Biology and Physiology, Medical Education Scholar, Assoc. Dean for SOM Admissions Block Chair Genetics and Neoplasia	Topics in Cancer Research Journal Club; Case development for Genetics and Neoplasia	Leyma DeHaro (PhD student)	Certificate in progress
Paul McGuire, PhD and **Angela Wandinger-Ness,** PhD	Topics in Human Anatomy	Heather Ward (fellow)	Completed TED workshop, will complete Scientist-Educator Fellowship in Morphological Sciences over next two years http://hsc.unm.edu/som/cbp/fellowship.shtml

*IRACDA: NIH sponsored Institutional Research and Academic Career Development Awards for fellows pursuing educational and research training.

THE UNIVERSITY OF NEW MEXICO
HEALTH SCIENCES CENTER
Department of Pathology MSC 08 4640

May 11, 2008

Faculty Senate Members:

As both Assistant Dean for Graduate Studies at UNM SOM and a program developer, I enthusiastically recommend the proposed Certificate Program in University Science Teaching in Biomedical Sciences for your approval.

Beginning in 2005 with a support from a Scholarship in Education Allocations Grant from the SOM, Dr. Rogers and I gradually instituted the requisite courses and training opportunities for graduate students in the Biomedical Sciences Graduate Program (BSGP) to gain expertise in teaching and education. We propose to bundle these courses as a transcripted certificate program to recognize the unique skills afforded by this training. All courses have been reviewed by the Faculty Senate and are approved for graduate study. We have identified a cohort of education mentors, student interest is strong and we have recognized the first two PhD students who have completed the requirements with non-transcripted certificates from the BSGP. The program capitalizes on the strengths of the UNM SOM in education excellence and faculty development programs. It demonstrably provides trainees with highly desirable skills in a competitive job market with several graduates in faculty level positions. This program is unique at UNM and in the southwest and will serve as a model for other graduate programs at UNM, including a program in Earth and Planetary Science that is under development by Matthew Nyman.

Dr. Rogers and I plan to apply for a K12 grant in September 2008 to make the program available to postdoctoral fellows. Therefore, we would be grateful for your expedited review and approval of this program.

Sincerely yours,

Angela Wandinger-Ness, PhD
Professor & Assistant Dean for Graduate Studies

2325 Camino de Salud, CRF 225 ♦ Albuquerque, NM 87131 ♦ 505-272-1459 ♦ FAX: 505-272-4193

THE UNIVERSITY OF NEW MEXICO ◆ HEALTH SCIENCES CENTER
SCHOOL OF MEDICINE

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May 14, 2008

Faculty Senate Members;

It is with great enthusiasm that I recommend for your approval the proposed Certificate Program in University Science Teaching in Biomedical Sciences. This program has been developed over the past three years thanks to the hard work and commitment of Drs. Sherry Rogers and Angela Wandinger-Ness. It is designed to give graduate students in the Biomedical Sciences Graduate Program here at the School of Medicine, courses and practical experiences which will allow them to develop expertise in teaching and education. This has been an aspect of graduate training which has been sorely missing in the program and will greatly increase the competitiveness of these students for future academic positions.

I am pleased to help support the efforts of this program by providing opportunities for graduate students to participate in the Human Anatomy for Basic Scientists course. In this course the graduate students will enroll in the Human Structure, Function and Development block, which I lead in the School of Medicine curriculum. During this course the students will acquire the requisite knowledge of the discipline. In subsequent years the students will be eligible for teaching assistantships and will serve as scientist-educator fellows in the course. Each fellow will participate as a full instructor and will be assigned a teaching mentor who will provide guidance and share pedagogical approaches for teaching in this type of course. The students will also have the unique opportunity of serving as full members of the course committee, and will learn the details of how such a course is designed, delivered, evaluated and modified.

Thank you for your consideration of this very worthwhile program.

Sincerely,

Paul G. McGuire, Ph.D.

CATALOG DESCRIPTION

CATALOG DESCRIPTION
Certificate Program in University Science Teaching in Biomedical Sciences

The University in Science Teaching Certificate Program is designed for trainees in the biomedical sciences to gain rigorous training in the educational pedagogy and practical experience in discipline specific teaching. This transcripted certificate program encompasses 15 credit hours of required and elective coursework and completion of a final portfolio and is designed to enhance competitiveness for careers that include teaching in the basic sciences. In addition to practical teaching experience, students gain exposure to, and hands-on experience with, multiple approaches to teaching through workshops, discussions, and project design, thereby developing creative, critical thinking, and communication skills that are also essential to successful research. The 15 credit hours required for the Certificate represent a concentration in educational development and teaching and are included in (not in addition to) the 66 credits required for the Ph.D. degree.

Qualifications

Students must have successfully completed their first year of the BSGP and passed the Qualifying Exam.

Curriculum

Required Courses and Activities (11 credits)

- BIOM525: Cell and Molecular Basis of Disease Journal Club (4)
- BIOM540: University Teacher Training (2)
- BIOM542: Teaching Assistant Practicum (2)
- BIOM543: Independent Education Immersion for Teaching Scholars (3)

Elective Courses and Activities (4 credits)

- BIOM541: Teacher Training Workshops (1). Workshops offered through the Teacher and Educational Development Office of the SOM can be bundled to provide the required 15 contact hours.
- BIOM544: Human Anatomy (4). Students successfully completing this course will be eligible for teaching assistantships in the Human Structure, Function, and Development Block of the phase I medical curriculum.
- BIOM542: Teaching Assistant Practicum (variable credits). Provides additional teaching experience.
- BIOM543: Independent Education Immersion for Teaching Scholars (up to 4 additional credits beyond the 3 required).
- CJ583: Teaching the Basic Course (1).
- EDPY510: Principles of Classroom Learning (3).
- EDPY572: Classroom Assessment (3).
- LEAD529: The Adult Learner (3).

Teaching Portfolio

Documentation of all activities leading to a Certificate will be assembled into a Teaching Portfolio, which will also include a statement of teaching philosophy.

GRADUATE PROGRAM PROJECTED COSTS

Graduate Program Projected Costs

1. New costs for program start-up.

As stated in the previous section, no new faculty, library resources, or additional facilities or equipment will be needed to begin the program or sustain it during the first five years.

2. State support.

TA positions for credit or pay are already available through the BSGP for teaching graduate and medical student groups (**Appendix item A3**). Paid positions are supported by the Executive Vice President for Research & Dean SOM, Dr. Paul Roth. In addition, BSGP students have taught for the Dept. of Biology and vice versa when slots are available. Students may elect to receive course/independent study toward their certificate (1 cr/15 hr class time) credit in lieu of monetary payment. Some of these credit hours may also substitute for elective credit hours toward their PhD degree. BSGP students are supported throughout their training period by GAs provided by the SOM Dean's office in their first year and their research mentor in subsequent years.

3. Other support.

The BSGP does not receive direct return of formula funding, therefore, growth of the program will depend on seeking external funding and support from the Executive Vice President for Research & Dean SOM. We will request funding for 1) additional TAships, 2) external review visits, 3) seminar speakers, 4) partial administrative and/or faculty salary commensurate with program growth.

The TED office is not charging tuition when graduate students take the workshops, though depending on the enrollment we expect to require a course fee to cover the cost of training materials. Currently, Wandinger-Ness and Rogers participate as trainers in the workshops to help compensate for TED increased workload. There is a course fee associated with the Human Anatomy course, the fee for which is paid by the student's department.

LIBRARY IMPACT STATEMENT

Library Impact Statement

We do not anticipate any significant change in library impact. The University in Science Teaching Certificate program is designed for graduate students in the biomedical sciences. The students who are expected to complete the program will be admitted from the Biomedical Sciences Graduate Program, on the PhD or MD/PhD track. This program has been steadily admitting on average 18 new PhD students and 1-2 MD/PhD students per year for the past 10 years.

UNM HEALTH SCIENCES LIBRARY and INFORMATICS CENTER

MEMORANDUM

To: Kathleen Sena, Registrar

Cc: Ignacio Ortiz, Office of Research & Graduate Studies

From: Dick Carr, Acting Deputy Director, Library Services

Date: July 7, 2008

Re: Health Sciences Library Impact Statement, Certificate Program in University Science Teaching in Biomedical Sciences

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This memorandum addresses the impact on the Health Sciences Library and Informatics Center (HSLIC) of the addition of the Certificate Program in University Science Teaching in Biomedical Sciences.

The program draws upon already existing classes and workshops.

There will be no significant impact to the library represented by these changes.

EFFECTS ON EXISTING PROGRAMS

Effects on Existing Programs

The proposed University in Science Teaching Certificate Program will benefit graduate and postdoctoral trainees in the biomedical sciences. All courses are already in place and being taught in the BSGP curriculum. The new program is designed for trainees in the biomedical sciences to gain rigorous training in the educational pedagogy and practical experience in discipline specific teaching. The students who are expected to complete the program will be admitted from the PhD or MD/PhD track in the Biomedical Sciences Graduate (BSGP) Program. The BSGP program has been steadily admitting on average 18 new PhD students and 1-2 MD/PhD students per year for the past 10 years and has approximately 109 PhD level trainees. A survey of student interest suggests 25% of students plan to complete some or all elements of the certificate program. This transcripted certificate encompasses 15 credit hours of required and elective coursework and completion of a final portfolio, but is not expected to increase time to degree. In September 2008 we plan to submit a grant proposal to NIH to enable postdoctoral fellows to complete the training. In sum the new program will dramatically enhance the training afforded to students and fellows in the biomedical sciences and successful completion is expected to dramatically enhance job competitiveness