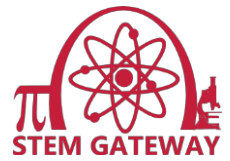


Gateway Science and Math Course Redesign Project Description



Issues to Address

- Aspiring and declared STEM majors experience high failure rates in gateway science and math courses
- Research shows that perceived poor quality instruction in science and math courses is the primary factor leading students to depart STEM fields and is a major concern of those who persist
- Implementation of curricular and pedagogical redesign, primarily focused on various aspects of interactive engagement, has improved student learning in STEM gateway courses, across the disciplines

The Goal

The STEM Gateway pathway to successful course redesign is characterized by:

- On-going exploration and adoption of evidence-based instructional practices
- Faculty engaged in continuous improvement of teaching and learning
- Dialogue around teaching supported through a community of practice
- Teaching informed by meaningful assessment

The fulfillment of this vision will result in increased student achievement of learning outcomes, retention, and degree attainment, especially among Hispanic and low-income students.

(Inspired by WIDER PERSIST, Boise State University)

Individual Course Redesign Projects



One (or two instructors) working to redesign a course that is required and is foundational to at least one STEM major (Contact Gary Smith, gsmith@unm.edu to confirm that your course qualifies). Tenure-stream and Lecturer faculty in natural science, mathematics, and engineering departments are eligible to apply; a graduate student or part-time instructor can partner with a regular faculty member.



Successful applicants will form a faculty learning community. To encourage access to close collaborators, preference will be given to applicants who are either proposing a partner on their project or where two separate proposals are submitted by faculty in the same department

Timeline



Assessment

Proposal

Redesign Work

Implementation (one or both semesters)

Expanded implementation plan

March

May-August

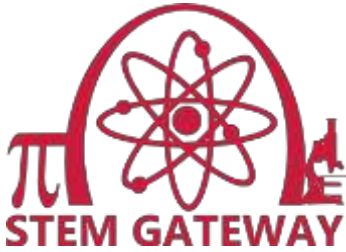
Fall Semester

Spring Semester

May

STEM Gateway compensation:





**Gateway STEM Course Redesign Program – Individual
Proposal 2015-2016
Due: March 30, 2015**

Important Dates

March 30, 2015: Gateway Science and Math Course Redesign proposals due. Submit to Gary Smith (gsmith@unm.edu).

April 10, 2015: Selection of successful course-redesign projects announced.

May 14, 15, 18, 2015: Course-redesign members *must* attend STEM Gateway Redesign Institute (2.5 days).

June 1-August 15, 2015: Course-redesign members develop proposed curriculum and pedagogical redesign elements; informal meetings between members and with STEM Gateway facilitators.

2015-2016 Academic Year: Implementation of redesign with collection of assessment data. STEM Gateway will advise throughout the process and arrange for ongoing monthly teaching professional development activity sessions for the faculty learning community.

Compensation Schedule

Summer 2015 compensation for faculty (1.5 months) begins on June 1.

Summer 2016 compensation for faculty (0.5 month) begins on June 1 provided that course-redesign implementation occurred as planned and assessment data were collected.

Continue to complete the proposal form

A. Foundational Information

Course number, or numbers (including department/program prefix): _____

Course name(s): _____

If the redesign will affect companion laboratory or recitation/problem solving sessions that have a separate course number/title, then please list these course numbers and titles in this space:

Typical number of sections and students taught during fall, spring, and summer semesters (listing lab and recitation/problem solving sessions separately from the lecture) for each course involved in the redesign proposal; also indicate how many sections are typically taught by the applicant(s):

Purpose. What are the specific, measurable objectives of your proposed redesign project?

Significance: Why are the objectives provided above important to the recruitment, retention, and graduation of students at UNM?

B. Preliminary Redesign Plan

STEM Gateway anticipates that your redesign plan will mature and change as a consequence of subsequent participation in the course-redesign institute and during the first-summer planning effort. However, a well-developed proposal should show that you have a foundational understanding of key concepts of course design in university-level science and the assessment of student learning.

The *preliminary* plan, presented as responses to the prompts found below, should show consideration of and a commitment to implement the five elements for a scientific approach to optimization of science education (modified from the [Carl Wieman Science Education Initiative](#), University of British Columbia and the [Top 25 Project](#), Miami University):

1. Specification of measurable learning outcomes
 2. Rigorous objective assessment of student achievement of these outcomes
 3. Implementation of teaching methods aimed at maximizing achievement with respect to the specified outcomes, that are consistent with empirically established results and principles
 - Use methods to actively engage students in their learning and with other learners and, wherever appropriate, employ inquiry-driven approaches to learning
 - Reduce the amount of class time spent on low-level memory or descriptive material by incorporating approaches to facilitate students learning this material outside of class
 - Methods are built on specific student learning outcomes tied to assessment that continuously monitors student learning and modifies the course as necessary
 4. Means for easy dissemination and duplication of materials, methods, and technology to other course instructors
 5. Sustainable and continued optimization based on results of assessment
1. List the measurable learning outcomes for the redesigned course (these may be the current student learning outcomes for the course or potential revisions to those outcomes).
2. At this preliminary point in your planning, how do you plan to assess student achievement of the outcomes stated in #1?

B. Preliminary Redesign Plan (*continued*)

3. Describe the teaching methods that you are currently considering for the redesign and link these proposed methods to (a) the purpose of your project described on page 3, (b) the learning outcomes stated above and (b) to your current knowledge of research on teaching and learning processes.

4. Describe your preliminary plan for disseminating information about your redesign and instructional materials for use by other instructors.

5. Explain how you plan to sustain, and improve upon, the redesigned course components following the one-year funded redesign effort.

C. Course redesign project members

One, or two, instructors may submit a proposal together to work on the same course. Each applicant must commit to participating in the events and processes described on p.7 as a member of the STEM Gateway Faculty Learning Community

Primary applicant; name _____

Rank/Position _____

Number of years teaching this course _____

Typical number of sections of this course taught each year _____

Project partner (optional) _____

Rank/Position _____

Number of years teaching this course _____

Typical number of sections of this course taught each year _____

Note: The primary applicant must be a tenure-stream or Lecturer faculty member. The project partner, if applicable, can be a graduate student or part-time instructor.

To your knowledge, is anyone else in your department submitting a proposal to STEM Gateway at this time? _____

If yes, who? _____

Note: The existence of multiple proposals from the same department enhances, rather than reduces, the likelihood of selection to participate in the STEM Gateway Course Redesign Project

D. Supporting Letter

Proposals must include a letter of support from the Department Chair that (a) certifies that the redesign proposed in the target course has broad support from the unit, and (b) provides assurances that the chair will encourage other faculty to work toward adopting effective innovations that arise from the project.

Certifications

The primary applicant and partner (if applicable) must sign below, acknowledging the following:

- ✓ Commitment to attend the *Designing Courses for Effective Student Learning* course-redesign institute; May 14 and 15 (9 am to 3:30 pm each day) and May 18 (8:30 am to 12:00 pm), 2015
- ✓ Commitment to participate in the course-redesign effort during Summer 2015 including a commitment to the five elements for a scientific approach to optimization of science education
- ✓ Commitment to implement the course-redesign elements when teaching the redesigned course during the 2015-2016 academic year, including classroom observations by project staff, and administration of surveys to students
- ✓ Commitment to attend at least 8 of the 12 monthly teaching professional development activity sessions throughout the year.

In addition, the *primary applicant* is responsible for the following:

- ✓ Collecting and submitting assessment data
- ✓ Responding to inquiries and correspondence from STEM Gateway

Primary applicant

Printed name Aurora Pun

Signature

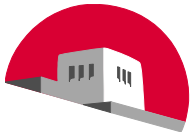


Project partner (if applicable)

Printed name Dylan Garcia

Signature





The University of New Mexico

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Telephone (505) 277-4204
FAX (505) 277-8843

March 27, 2015

STEM Gateway Advisory Council:

I wholeheartedly support the efforts by Dr. Aurora Pun and Dylan Garcia to pursue a course redesign for ENVS 102L. The Blue Planet labs are very popular among students who need to take a 1-credit lab science to fulfill their core-requirements. These labs fill to capacity each semester. More importantly for the objectives of STEM Gateway, the Blue Planet lecture and lab courses are notable for recruiting students, especially Hispanic and Native American learners, into the Environmental Science degree program. Our Department wants to make sure to engage, spark interest, and enlighten our students on how environmental scientists do science. Students are asked to collect data by modeling real-world procedures employed by scientists in today's workforce, such as taking water quality measurements and samples along the Rio Grande. They are asked to think critically in a scientific context in issues such as how environmental problems affect our society and community- issues such as leaking jet fuel spills at nearby Kirtland AFB and how they might be characterized and mitigated. Outcome assessments (aligned with NM HED competencies for laboratory sciences and the Environmental Sciences BS degree) would be developed and data collected for the course. This redesign would complement our departmental efforts (presently under way) to redesign the entire Environmental Sciences undergraduate degree program. The content of the lab would be developed to provide a good foundation for students wanting to pursue a degree in environmental sciences and to be prepared for the more rigorous environmental science program. The labs would also be used to recruit students in pursuing environmental science degrees.

As Chair, I assure the committee that I will encourage our faculty to consider using the teaching and learning strategies being developed in this course redesign. The 102L lab structure is such that all sections are overseen by a coordinator (Aurora Pun for 2015-16) and the results of this redesign can be translated readily to all of our 102L sections. We can take the fundamentals of evidence-based research and best practices to improve teaching and learning as developed and proposed by STEM Gateway as our department begins its redesign of our entire Environmental Sciences Program.

I hope that you will accept the ENVS 102L as a course redesign project. I know that Aurora and Dylan will do an excellent job improving our Blue Planet labs.

Sincerely,

Dr. Laura Crossey
Chair and Professor