

## Current Academic Courses

**TITLE OF PROJECT:** “Mars Desert Research Station Field School for MST Teachers”

**CONTACT:** Dr. Penelope J. Boston

**ABSTRACT:**

We propose an innovative field school opportunity for NMT Master's in Science Teaching students (typically in-service NM classroom teachers). This two-week transformative field science experience in the desert of south central Utah will encompass an integrated program of geology, mineralogy, biology, microbiology, planetary science, and observational astronomy. It will engage students in ongoing real science experiments. Participants will be housed at the Mars Desert Research Station operated by the Mars Society. This facility is constructed to simulate a future human habitat on Mars and has been in operation since 2002 hosting numerous expeditions including a variety funded by NASA, NSF, Canadian Space Agency, ESA, etc.

Program objectives include teacher exposure to ongoing field science across a broad spectrum of disciplines, assistance in translating these transformative experiences to their own classrooms and teacher peers, and ultimately strengthening STEM competitiveness of NM K-12 students.

Specific outcomes will include greater teacher awareness of NASA mission science and exploration, interdisciplinarity, understanding demands and rewards of fieldwork, enhanced knowledge about arid southwestern environments, guided pedagogical interpretation of teacher experiences into curriculum materials, and participation of NM teachers in high fidelity space-related science experiences.

A 10-month planning period will culminate in online pre-expedition briefings, safety and wilderness skills training (NMT), a lavatube Moon/Mars analog excursion (El Malpais Nat. Mon., Grants, NM), field school at MDRS (Utah), and post-expedition follow-up assistance with curriculum ideas and activities. Partly modeled after the highly successful NASA Ames-funded *Spaceward Bound*, we extensively leverage other financial and personnel support and plans for sustainability.

**TITLE OF PROJECT:** "Undergraduate Student Achievement in Spaceflight Mission Design"

**CONTACT:** Eric A. Butcher

**ABSTRACT:**

The proposed project concerns course redesign and curriculum development in the area of spaceflight mission design at New Mexico State University (Las Cruces), as well as tracking changes in student achievement in this area. The PI, who has a background in teaching an undergraduate aerospace engineering class in orbital mechanics and spaceflight dynamics at other institutions, is currently teaching AE 362 Orbital Mechanics for the first time at NMSU and expects to be teaching the course on a regular basis in the future. Many aspects of the course are out of date and need significant revision, however. The project objective are to redesign the course and develop a new curriculum which focuses on NASA's current and future manned and unmanned space missions. Key features will include web-based course notes with links to homepages of various NASA missions, field trips to the NASA White Sands testing facility, and assessment of changes in student achievement in course projects. The probable outcomes include an increased student interest in pursuing careers in spaceflight mission design and in NASA. Most of the course redesign will occur in the Fall 2009 semester in which the PI will utilize an academic course release to work on this project, prior to teaching the course again in the spring 2010 semester. Additional help for this task from the PI's graduate student (whose current research project is related to this area) will be provided through cost matching from the College of Engineering and Department of Mechanical and Aerospace Engineering at NMSU.

**TITLE OF PROJECT:** “Applied Curriculum Development in Renewable Energy Technologies”

**CONTACT:** Thomas Jenkins

**ABSTRACT:**

A collaborative partnership between the New Mexico State University Department of Engineering Technology and Survey Engineering (**ETSE**) along with the Southwest Technology Development Institute (**SWTDI**), a division of the Institute for Energy and the Environment (**IEE**), are seeking funding assistance from the New Mexico Space Grant Consortium (**NMSGC**) Education Enhancement Program to meet the following objectives during the 2009-2010 grant fiscal year:

**Primary Focus:**

- Design and implement ***applied curriculum components such as laboratory exercises and student projects*** in courses which have no applied portion and refine the current courses which have these components. These will support the complementary theory-based curriculum components in the Renewable Energy Technology (RET) courses. These courses currently include:
  - ET 381: Renewable Energy Technologies (*refine current applied portion*)
  - ET 382: Solar Energy Technologies (*refine current applied portion*)
  - ET 384: Wind and Water Energy Technologies (*no applied portion at this time*)
  - ET 386: Sustainable Building Design (*no applied portion at this time*)
  - Provide support and job training to undergraduate student(s) via assistantship styled opportunities with the RET program.
  
- Investigate the design and development of a RET course that would address the engineering of **renewable and alternative fuels**. This class could be designed and implemented in collaboration with the Chemical Engineering Department at NMSU and/or the IEE.
  
- In partnership with NMSU Physical Science Laboratory (PSL), redesign, refurbish, and instrument a **medium-scale solar furnace**. The solar furnace would be the only known solar furnace dedicated to university teaching environment. In addition, we will develop related laboratory exercises, student projects, and seek private sponsored applications. This project will facilitate an increasingly sophisticated and relevant utilization of a valuable teaching tool in the **solar thermal** RET area.
  
- Work in collaboration with NM community colleges in developing a comprehensive approach to 2-year and 4-year engineering and engineering technology curriculum components related to RET.