



JORNADA BASIN LTER

LONG TERM ECOLOGICAL RESEARCH

Research Experience for Undergraduates (REU)

The NSF-supported Jornada Basin Long-Term Ecological Research (LTER) program has opportunities for undergraduate students to participate in research during the summer of 2022. Each participant will develop a personalized project under the guidance of a suitable mentor associated with the Jornada LTER and/or New Mexico State University.

Successful applicants will be awarded a stipend of \$8,000 for the summer field season (5/15 – 8/14) to cover stipend, living, and travel expenses. Activities will be conducted on the campus of NMSU with fieldwork at the Jornada research site northeast of Las Cruces, NM.

How to Apply

Applications will be evaluated upon submission, with priority given to those received before the deadline, and positions being filled as long as funding is available. Applications from underrepresented minorities are particularly encouraged. Based on their interests, applicants can select one or more of the research outlines below, or work with a JRN mentor to develop their own ideas. Complete applications should include:

- Completed Application Form
- Resume or Curriculum Vitae
- Unofficial Undergraduate Transcripts

About the Jornada LTER

The Jornada Basin Long-Term Ecological Research Program is focused on the ecology of drylands in the southwest USA, including the causes and consequences of alternative ecosystem states and expansion of woody plants into grasslands.

We are interested in spatial and temporal variation in ecosystem dynamics, and how historic legacies, geomorphology, wind, water, climate, and land use interact with vegetation, soils, microbes, and animals to determine past, present, and future ecosystem states across different scales. We use a large suite of long-term ecological and climatic data to understand and predict these dynamics.

More information on the LTER program is available at <https://lter.jornada.nmsu.edu>.

Applications Due: March 15, 2022

To apply, send all application materials compiled into a single file (e.g. PDF) to: **Madeleine Soss (msoss@nmsu.edu)**





JORNADA LTER RESEARCH EXPERIENCE FOR UNDERGRADUATES

Due March 15, 2022 to Madeleine Soss (msoss@nmsu.edu)

APPLICANT INFORMATION			
Last Name:	First:	M.I.	Date:
Street Address:	Apartment/Unit #:		
City:	State:	ZIP:	
Phone:	E-mail Address:		
Undergraduate Major/Minor:			
Expected Graduation Date:	University Name/Location:		
Project number(s) you are interested in:			
Are you a citizen of the United States? YES <input type="checkbox"/> NO <input type="checkbox"/>			

PLEASE ATTACH RESUME AND UNOFFICIAL UNDERGRADUATE TRANSCRIPTS

REFERENCES (can include your proposed JRN-REU mentor or other)	
1. Full Name:	Relationship:
Affiliation:	Email:
Address:	
2. Full Name:	Relationship:
Affiliation:	Email:
Address:	

Applicants are encouraged (not required) to contact the REU mentors to ask questions about summer research.

DISCLAIMER AND SIGNATURE	
I understand that false or misleading information in my application or interview may result in disqualification.	
Name	Date

Jornada Basin LTER REU Research Projects

Please look over these project descriptions and indicate the Project Number(s) (Ex: #1, #2, etc.) that you are most interested in on the attached application form.

Projects:

1. In the Pietrasiak Dryland Microbes Lab we 1) quantify and discover dryland microbial diversity (we especially are fascinated by cyanobacteria and algae); 2) investigate the role of microbes in dryland ecosystem functioning and soil health; and 3) identify key microbial ecosystem players and traits important for bioprospecting and resource management. We apply a variety of diverse approaches including cutting edge DNA based techniques and bioinformatics, advanced microscopy, traditional microbial isolation and culturing methods, as well as soil ecological, field biological, and landscape ecological methods to study dryland microbes. Our research is highly interdisciplinary and addresses questions in resource management, ecology, biogeography, and systematics of microbes in the most arid soils and rock substrates of the Americas. Anticipated 2022 summer projects involving dryland soil microbes and biocrust will focus on:
 - Assessing the abundance of biological soil crusts in diverse Chihuahuan Desert habitats
 - Characterizing the cyanobacterial diversity of Chihuahua Desert soils
 - Assessing the microbial composition of dust obtained from locations reflecting diverse dryland management practices
 - Identifying the role of biocrusts in carbon cycling and soil stability in the Chihuahuan Desert

Contact Information:

Dr. Nicole Pietrasiak

npietras@nmsu.edu

<http://aces.nmsu.edu/academics/pes/soil-faculty.html>

Twitter: @DrylandAlgae

2. The [Hydrologic Science, Engineering and Sustainability](#) group at Arizona State University (Prof. Enrique Vivoni) is seeking an undergraduate researcher interested in working on ecohydrological processes at the Jornada Experimental Range, near Las Cruces, New Mexico. The overall goal is to understand hydrologic connectivity across a landscape and how different types of vegetation mediate the transport of water. Our current efforts include:
 - Ecohydrological monitoring of water, energy, and carbon dynamics in a first-order watershed
 - Remote sensing and ground observations of playa water and soil moisture dynamics
 - Characterizing rainfall patterns using field observations and weather radar data

The summer research project would involve a combination of field data collection and monitoring activities with computer-based data processing and analysis.

Contact Information:

Dr. Enrique Vivoni

vivoni@asu.edu

3. Soils and landforms provide the physical template on which ecosystems reside and evolve in arid and semiarid regions of the world, such as those at the Jornada Basin LTER. In addition to their physical and chemical properties that affect modern vegetative patterns, soils carry a memory of biomes of the past. This REU would work with Dr. Curtis Monger on field, lab, and computer studies that advance previous work at the Jornada. The goal of the first project is to make a “caliche” map of the Jornada Basin based on current data to dispel the widespread notion that the entire area is underlain by an indurated calcium carbonate layer. While this is true for some areas, it is not true for others. The REU will work with Dr. Monger to gather into one location all the current soil profile data which resides in various databases. Once assembled, they will generate a map of the soil carbonate stages (I to VI). The map can then be ground-truthed for accuracy and combined with remote sensing data to provide a better understanding of the subsurface. The second project will involve an isotopic investigation of soils at the Jornada for evidence of the vegetation during the Little Ice Age (ca. CE 1500 to 1850) and the Medieval Warm Period (ca. CE 800 to 1300). This investigation will build on previous studies in the scarplet/arcuate dune area southeast of the JER Headquarters. Both projects will provide the student with an expanded scientific understanding of the relationships between soils, vegetation, and climate change.

Contact Information:

Dr. H. Curtis Monger
cmonger@nmsu.edu

4. **How do Shrubs in Drylands Use and Compete for Water?**

Many landscapes of the southwestern USA have experienced shrub-encroachment. This field-based study will contribute to our understanding of how shrub populations use water and eventually, compete with each other to limit maximum shrub density and cover. The REU student will work closely with a graduate student to survey shrub communities using unoccupied aerial system (UAS) imagery and other sources of remote-sensing data related to shrub ecophysiology. In addition, the student will contribute to field surveys of ground measured leaf area index (LAI) to monitor shrub structure and evaluate the quality of previous analyses. Depending on the interests of the student they can contribute to UAS data analysis, field and laboratory activities, meta-analysis of larger global patterns in woody plant resource use, and publications and presentations emerging from the research.

Contact Information

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