

UNIVERSITY OF WYOMING
Energy Science Graduate Stipends and Fellowships
NOVEMBER 1, 2019

[Pursuant to 2011 Session Laws, Chapter 88, Section 346(d)(ii)(D) and
2017 Sessions Laws, Chapter 176, Section 1(a)]

To the Joint Appropriations Committee; Joint Minerals, Business and
Economic Development Committee; and Governor of the State of Wyoming

During its 2011 session, the legislature appropriated \$6,247,930 in Abandoned Mine Lands funds to UW's Division of Academic Affairs for energy science graduate stipends and fellowships. The funds were to be expended over multiple years with not more than \$1 million expended each year. Although the remaining 2011 funds were due to revert in June 2018, 2017 Sessions Laws Chapter 176 reappropriated up to \$2,833,073.00 to the University of Wyoming for energy science graduate stipends and fellowships. This reappropriation began in FY2019 and will not revert until June 30, 2020. The actual available funding through 2020 is approximately \$1.6m, and this funding is being used to support Energy Science Graduate Assistantships for FY2019 – FY2020.

In response to Academic Affairs' Fall 2017 RFP, forty-nine applications for two-year Energy Science Graduate Assistantships were submitted. Twenty-one assistantships (approximately \$1.3m in funding over FY2019-FY2020) were awarded. Two of the assistantships are funding graduate students in their first year of funding. Eighteen are funding students who previously received Energy Science Graduate Assistantships, and one assistantship ended after FY2019. The FY2019-2020 reallocation includes the requirement that at least fifty percent of the funds be used to support Wyoming residents or UW alumni. The University of Wyoming met this requirement. Thirteen (65%) of the twenty students who received FY2020 Energy Science Graduate Assistantships, are Wyoming residents and/or UW alumni.

The Energy Science Graduate Assistantship awards continue to elevate the stature of graduate education by providing competitive stipends for recruiting and retaining outstanding graduate students. Energy Graduate Assistants have higher average Graduate Record Exam scores and undergraduate grade point averages than other students in their majors. Furthermore, Energy Graduate Assistants have higher grade point averages upon completion of their degrees than other students in their majors.

As in prior years, the FY2020 awards support fundamental research in a wide array of energy topics important to Wyoming (Table 1). More than 93% of the research conducted by Energy Science GAs and their faculty mentors has involved energy applications in the state. Thus far, the Energy Graduate Assistantship funding has helped UW faculty obtain more than \$6m in grant funding from sources including the U.S. Department of Energy, the National Science Foundation, the United States Geological Survey, and industry. The Energy Science Graduate Assistantship funding has to date enhanced Energy Science research within the Colleges of: Engineering & Applied Sciences (50 projects), Arts & Sciences (42), Agriculture & Natural Resources (10), and Business (7). Departments involved in the research include Agricultural and

Applied Economics, Atmospheric Sciences, Chemical Engineering, Chemistry, Civil and Architectural Engineering, Economics, Electrical and Computer Engineering, Ecosystem Science & Management, Geology & Geophysics, Global and Area Studies, Haub School, Mathematics & Statistics, Mechanical Engineering, Molecular Biology, Petroleum Engineering, Physics and Astronomy, Plant Sciences, Program in Ecology, the School of Energy Resources, and Zoology and Physiology.

Since AY 2011-12, 111 graduate students have been awarded Energy Science Graduate Assistantships. During this period, eighty graduate degrees have been awarded (50 masters and 30 doctoral). There are thirty-nine students pursuing graduate degrees who are current or past Energy Science Graduate Assistantship awardees. Fourteen students departed their program without degrees.

Table 1. Departments and project foci of FY2019-FY2020 Energy GA awards.

Department	Topic	M/F	Undergraduate Institution	Residency
Atmospheric Science	Improved wind energy forecasting	M	University of Illinois	Out of State /Alumni
Atmospheric Science	Development of a Photochemical Model to Predict Future Ozone Events in the Upper Green River Basin	F	Kathmandu University	International
Atmospheric Science (School of Energy Resources (SER))	Quantifying and Identifying Reduction Mechanisms for Methane and Volatile Organic Compound Emissions From Oil and Gas Basins in the Western United States to Enable Energy Production with Minimal Air Quality and Climate Impacts	F	South Dakota School of Mines and Technology	Out of State / Alumni
Chemical Engineering	Pre-concentration and Extraction of Rare Earth Elements from the nation's Most Prolific Western Coal Basins Using Surface Engineered Membranes	M	University of Wyoming	In State / Alumni
Chemical Engineering	The goal of this project is to investigate bimetallic overlayer catalysts materials for use in the dry reforming of carbon dioxide to produce synthesis gas for liquid fuels.	M	University of Wyoming	International / Alumni
Chemical Engineering	Laser patterned conductive thin films derived from coal	M	University of Wyoming	Out of State / Alumni

Table 1 (continued)

Department	Topic	M/F	Undergraduate Institution	Residency
Civil and Architectural Engineering	Inelastic Design Of Energy Infrastructure for Wind and Ice Accretion	F	California Poly State University, SLO	In State
Economics – original student was replaced for year two	A Comparison of the Risk of Transporting Crude Oil: Rail vs. Pipeline	M M	Utah State University Shahjalal University of Science and Technology	Out of State International
Economics (SER) and ENR, Haub School	Wind Energy Siting for Wyoming: Creating Tools to Mitigate Environmental Impacts, Maximize Economic Benefits and Develop Policy	M	University of Wyoming	In State / Alumni
Mathematics – original student was replaced for year two	Wind Energy Simulations: Towards Theoretically Sound Computations (continued project - Part II?)	M M	Moscow Institute of Physics and Technology Federal University of Tech Akure	International International
Mathematics	Efficient Methods for Quantification of Uncertainty and Numerical Error with Application to Simulation, Inversion and Optimization of Extreme-scale Multiphysics Systems		Montana Tech of the University of Montana	International
Mechanical Engineering	Nano-Adhesive Layer for Next Generation Metallic Thin-Films for Use in Energy Applications (Continued Project)	M	Rowan University	Out of State / Alumni

Table 1 (continued)

Department	Topic	M/F	Undergraduate Institution	Residency
Mechanical Engineering – two students; one was supported in the fall 2018 semester (only) and the other began in the spring 2019 semester	Understanding Point Defect Energetics in Metal Oxides for Gas Sensors	M M	University of Wyoming University of Wyoming	Out of State / Alumni International / Alumni
Mechanical Engineering – department no longer using energy funds for this student	Low and High Temperature Oxidation of Torrefied Biomass with PRB Coal	F	University of Wyoming	Out of State / Alumni
Physics and Astronomy	Aligned Metallic Carbon Nanotube Films for Highly Directional Energy Transport	M	University of Wyoming	In state / Alumni
Physics and Astronomy	Materials Research for the Production of Ndfeb Permanent Magnets in the State of Wyoming	M	Brigham Young University / Utah State University	Out of State / Alumni
Physics and Astronomy	Magnetic Dopant Effects on the Solar Cell Performance of Organometallic Halide Perovskite Materials and Inkjet Printing Feasibility	M	Tribhuvan University, Tri-Chandra Campus	International
Physics and Astronomy	The Effect of og Magnetic Impurities on the Efficiency of Quantum Dot Sensitized Solar Cells	M	Univeristy of Wyoming	In state / Alumni
Plant Sciences	Reclamation of Disturbed Areas Used by Gas Industries in Wyoming by Using Some Promising Grass and Legume Genotypes	M	Tribuhaven University	International

Table 1 (continued)

Department	Topic	M/F	Undergraduate Institution	Residency
Program in Ecology (Botany)	New Project: 1. Determine if Trait-Based Theories Can Be Applied to Restore Plant Communities That Are Drought-Tolerant and Invasion-Resistant. 2. Quantify How Communities Optimized for Drought Tolerance, Invasion Resistance, or Functional Diversity Influence Critical Ecosystem Functions Including Productivity, Forage Quality, Nutrient Cycling, and Water Use.	F	Northern State University	Out of State
Zoology and Physiology (WY Coop Unit)	Of Mice and Birds: Disentangling Species Dynamics within Wyoming's Natural Gas Fields	F	University of Wyoming	Out of State / Alumni