SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Excellence in Undergraduate Education (EUE) Proposal

Project ID# (*leave blank*)

25-01

Project Title

Environmental Equity: Integrating Justice and Inclusivity into Principles of Environmental Science

Project Director	ID Number	Telephone	Email
Adriana Martinez	800532612	5655	adrmart@siue.edu

Department	Campus Box	School College
Environmental Science	1099	Arts & Sciences

Course or Program

ENSC 220: Principles of Environmental Science

Project Co-Director	ID	Department	Email

Student Impact:	100+/yr

Priority Rating (If Submitting Multiple Proposals):	

Project Budget

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total
6433.55			60						6493.55

Cost-Sharing

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total

Prior EUE Support

Project Director	Project Number	Award Amount	Project Dates
Adriana Martinez		8000	2017
Adriana Martinez		8750	2019

Applicable 2024-2025 Priorities (*check which priority your proposal fits, if any*):

- ☑ Course redesign project that uses inclusive, student-centered pedagogies to address equity gaps, improve student learning outcomes, & enhance retention
- ☐ Project involves courses that have high number of sections, a high ratio of D/F/W grades, or those key required courses with high enrollments and opportunities to improve equitable student success.

Title: Environmental Equity: Integrating Justice and Inclusivity into *Principles of Environmental Science*

Summary

The goal of this project is to continue to bring in additional mechanisms for inclusive practices and environmental justice themes to a primarily online course: *ENSC 220-Principles of Environmental Sciences*. In Spring of 2024, the course began utilizing an Open Educational Resource (OER) textbook and, through that program, a select number of case studies regarding Native Americas were developed. This EUE aims to continue to improve and adjust these efforts in three ways 1) further develop three more Native American case studies, 2) develop five environmental justice case studies, and 3) create guided lecture and reading questions for each of the chapters and 4) develop exam reviews for credit. Each of these added components will provide additional structure to the course so it is more inclusive for the student population.

According to literature regarding inclusive practices in courses, adding structure to a course helps student retention and success (Hogan & Sathy, 2022). The three goals proposed here will help create additional structure in a course that students often struggle with due to its online nature. First, the current textbook does not have any related chapter forms of assessment because it is OER. Therefore, I propose to develop a set of guided lecture questions that will both create structured deadlines so students stay on task, help them prepare for their exams, and be a low stakes assignment that can improve their grade overall. Second, my recent deployment of the OER textbook and the Native American case studies has made it clear that the students enjoy this work and I believe there are at least three more topics in which I can develop three additional case studies. In addition, I would like to add five case studies that expand beyond Indigenous issues into environmental justice issues more generally. And finally, I will develop exam reviews that can be offered for credit to provide additional mechanisms for students to improve their grade.

I include here a request for 3 weeks of summer salary to develop the guided questions, case studies and exam reviews and the purchase of a book for reading in preparation of case studies. In addition, I plan on testing the new case studies with students from my ENSC 220 course from the Fall 2024 throughout the semester to determine if they are successful. I also plan on sharing these methods with fellow faculty so that they might incorporate additional methods of structure as well as case studies in their courses.

This course is required for all ENSC majors and minors and serves many non-majors as a Breadth-Physical Sciences and has an accompanying lab (220L) that students use to fulfill lab requirements. It reaches approximately 100 students per year and is taught every semester. This many not be one of SIUE's most highly enrolled courses, but it is one of the largest course sections in Environmental Sciences and it reaches large groups of non-science students that often require additional supports for success. The course also serves as one of the main mechanisms to draw students into the major and minor.

I. Current Situation

Principles of Environmental Sciences (ENSC 220) has been a long running course that switched primarily to online teaching within the last five years due to the desire of students to complete a course of this nature online. In addition, in Spring 2024 I implemented the use of an Open Educational Resource (OER) textbook for the first time as part of an initiative to decrease textbook costs University wide. I am the primary instructor for the course and we typically see enrollments of 100 students per year. As part of the OER initiative, I evaluated and implemented the textbook *Introduction to Environmental Sciences and Sustainability* (Harris 2023). As part of the OER program I will be reaching out to a handful of students at the end of Spring 2024 to evaluate the OER textbook. In addition, I developed five Native American case studies where students read about a current event regarding a Native American tribe and an environmental issue or topic and then answer reflection questions about the reading materials. The current case studies are as follows:

1) Klallam Olympic Cougar Project: tracking cougar populations due to habitat fragmentation;
2) Navajo Nation Water: Navajo Nation and the effect of water rights and drought;
3) Salmon and dam removals: the politics behind funding to reintroduce salmon and restore salmon habitat in the Columbia River basin;
4) Quinault sea level rise: a tribal town is relocating due to sea level rise;
5) Seminole Everglades: tribe grapples with water quality issues in the Florida Everglades.

ENSC 220 is a required course for all undergraduate Environmental Science majors and minors. In addition, the course serves many non-majors as a Breadth-Physical Sciences and has an accompanying lab (220L) that many students opt to take to fulfill their Experiences-Laboratory requirement. The department currently has approximately 30 majors, a number which has been steadily increasing since 2020 and all of which are required to take the course. In addition, anecdotally, I can say that the course reaches a large number of minoritized students, primarily African American. For this reason, I wish to continue to make the course more accessible and inclusive for students. Given that this is an online course, I believe that

additional structure (Hogan & Sathy, 2022) to a completely online course will help students stay focused, and provide additional assignments within which their grade can be distributed.

This semester I scheduled individual five-minute meetings with all students so I could begin to develop a relationship with them despite the course being online. In many of these meetings, the students expressed excitement around the Native American assignments and project (they will write a two-page paper on a topic of their choosing regarding a tribe). Therefore, I believe further developing case studies will greatly add to the attractiveness of the course.

II. Proposed Project

To further develop the course past the OER goals, I wish to 1) create guided questions for each lecture, 2) create three additional Native American case studies, 3) create five new environmental justice case studies, and 4) create exam reviews that the students can turn in for credit. Each of these objectives will create structure to the course and make the course more inclusive.

Objective 1: Guided Lecture Questions. Because we are utilizing an OER textbook, no chapter questions are provided to use with the textbook. Therefore, I wish to create a set of assignments associated with each of my recorded lectures that helps the students stay on track with lecture watching and chapter reading. There are 14 chapters so I will create assignments associated with at least each chapter, though in some cases, for lengthier chapters, I may create additional comprehension assignments. Assignments will be a mix of multiple choice and short answer and will be designed to prepare students for the exam so that they see examples of questions that are similar to those on the more significant course assessments. These will likely be graded for completion once deployed in the course because a teaching assistant is not provided and I wish to concentrate my grading efforts on the case studies that involve more reflection.

Objective 2 and 3: Case Studies. Through the SIUE OER program I developed five case studies on current events of Native American tribes either dealing with an environmental issue or conducting environmental restoration. I wish to create three additional Native American (NA) case studies and supplement these with other environmental justice (EJ) current event topics. Both the NA and EJ topics will expand the student's current knowledge on not only current environmental events but also how marginalized communities are disproportionately affected by environmental issues. I first implemented Native American environmental topics three semesters ago. That took the form of a short paper the students wrote on a tribe and environmental topic of their choosing. I have received great enthusiasm on this project; students often state that it had not occurred to them that tribes could be affected by their local environment. In one extreme case, a student did not know that tribes still existed. Due to this enthusiasm and clear gap in education, I chose to implement the added case studies in Spring 2024. This EUE funding would allow me to expand the case studies and begin to incorporate other marginalized communities through the EJ case studies.

First, I will read the book *Wildlife Stewardship on Tribal Lands: Our Place Is in Our Soul,* edited by Hoagland and Albert (2023) to brainstorm ideas and prepare to create additional case studies. Because I want students to interact with current news, these case studies consist of reading 1-2 current event articles on the topic and answering 3-5 reflection questions that I have written for them. This not only brings in a current event but also allows them to engage with current event publications. This is the very definition of experiential activity that SIUE uses in undergraduate reports in which students learn by doing, reflect upon the learning, and get feedback while encountering real world problems. These case studies will be graded by me once deployed so I can ensure students are reflecting on the topics. In addition to new case study creation, I will adjust and edit the previous case studies given any new information I have learned from my reading of the Hoagland and Albert book. In addition, the students will not be required to complete all the case studies. For a more flexible and inclusive course, I plan on

allowing the students to choose the case studies they complete. For example, they will be required to complete only eight out of the 13 case studies and can choose those they find most interesting.

Potential case studies are as follows: 1) Dakota Access Pipeline and Standing Rock Sioux, 2) recovery from oil spills (several tribes to choose from); 3) Standing Rock Sioux and restoration of black footed ferret habitat; 4) Ojibwe and their relationship with wild rice; 5) Yup'ik and melting permafrost. Additionally, my aim is to center the environmental justice case studies around brownfield and superfund sites and highlight how they relate to environmental legislation such as the Clean Air and Clean Water Act. While many of these case studies are tragedies, I do intend to highlight areas of success and where tribal nations have played a role in restoration. But, like many environmental topics, the news is not good.

Objective 4: Exam Reviews. To add additional structure to the course, Hogan and Sathy (2022) recommend the use of exam reviews for a grade. This added structure, again, keeps students on track in an online course, gives them additional points for their total grade, and helps prepare them for each exam. The exam reviews will take the form of a list of topics as well as open ended questions posed where students will be asked to explain concepts learned from the course material. Once deployed in the course, these will be graded for completion and not correctness in order to minimize grading. Additional work will be required for these because rather than a list of topics I typically provide on an exam review, I will be formulating questions the students can use to study and prepare.

III. Alignment with EUE emphases

This project will reach at least 100 students each year as a requirement for ENSC majors/minors as well as students taking the course for breadth or lab credit. In addition, it is taught every semester and at times in the summer. While this is not a large number compared to other courses, it is one of the largest enrolled courses in Environmental Sciences and often serves as science credit for non-science majors. Therefore, I have the opportunity to reach a

large number of students beyond a single semester. In addition, it is a science course that incorporates indigenous stories and knowledge which is innovative, inclusive, and as described above, experiential learning. I have taught the course almost every semester since 2013, moved the course online shortly after I began teaching it, and have tried to be innovative throughout. Most recently this was accomplished by moving this course to OER and I hope to continue to make the course more inclusive through this proposed EUE. The methodologies described above allow me to incorporate additional structure into the course so that I can improve student learning outcomes and support students in a completely online course. My hope is that these methods will help address equity gaps by creating more contact with students, adding in additional assessment methods, and walking through primarily freshman in what may be one of their first online courses.

In addition, this EUE aims to create structure for courses to improve student learning and retention. Nationally, approximately one-third of students are first generation (National Center for Education Statistics). In addition, at SIUE as a whole 33.1%, and within the College of Arts and Sciences 38%, are non-white students. This EUE aims to support these students through the proposed activities.

IV. Evaluation and Dissemination Plan

To evaluate the proposed assignments, I will implement them in Fall 2024. Following the first exam, I will distribute a Qualtrics survey asking for student's feedback on the guided lecture questions and exam review so that I can adjust them for student needs before the remainder of the semester. In addition, at the end of the semester I will deploy a Qualtrics survey to ask for feedback on the remainder of the guided questions, exam reviews, and case studies. I will not deploy questions on the case studies with the first survey because the first set of case studies is not due until after Exam 1. Surveys will not be collecting any personal information. Once I have received feedback, I will improve the assignments and share this

information with my department and other professors for those interested in incorporating these methods.

V. Budget and Budget Justification

To complete the guided questions, case studies, exam reviews and surveys, I expect the following hours for each of the associated tasks. This ultimately results in 3 weeks work in the summer and therefore I request 3 weeks of summer salary.

Item	#	Hours (each)	Total Hours/cost
Guided Questions	16 (estimated)	3	48
Case Studies	NA (3), EJ (5)	6	48
Exam Reviews	3	3	9
Qualtrics survey creation and response compiling	2	3	6
Hoagland and Albert book			$60
Total Hours			**111 hours**
Request in summer salary			**3 weeks $6,433.55**
Total $ Request			**$6,493.55**

References

Harris, Emily P. 2023. Introduction to Environmental Sciences and Sustainability. University of West Florida Pressbooks.

Hogan, Kelly A and Sathy, Viji. 2022. Inclusive Teaching: Strategies for Promoting Equity in the College Classroom. West Virginia University Press.

Hoagland, Serra J. and Albert, Steven (eds). 2023. Wildlife Stewardship on Tribal Lands. Johns Hopkins University Press.

National Center for Education Statistics.Parents' Highest Education Level by Race/Ethnicity and Gender. National Postsecondary Student Aid Study: 2016 Undergraduates. U.S. Department of Education. Accessed March 2023.

SIUE. Fact Book 2024 Edition. Institutional Research and Studies. https://www.siue.edu/inrs/factbook/pdf/ FbCurrent.pdf

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EDUCATION

Doctor of Philosophy, Spring 2013, University of Oregon, Department of Geography; Advisor: Dr. Patricia McDowell
Master of Science, Spring 2008, Texas A&M University, Department of Geography; Advisor: Dr. Anne Chin
Bachelor of Science, Spring 2005, Texas A&M University, Environmental Geosciences, Minor: Earth Sciences

POSITIONS

2019-Present	Associate Professor, Southern Illinois University Edwardsville, Joint Position: Department of Geography and Geographic Information Sciences and Department of Environmental Sciences
2013-2019	Assistant Professor, Southern Illinois University Edwardsville, Joint Position: Department of Geography and Department of Environmental Sciences

AWARDS AND ACHIEVEMENTS

2023	Elevate the Discipline, American Association of Geographers. (Competitive program designed to enhance skills in policy, advocacy, media, and leadership so the cohort can make significant contributions to the field of geography).
2022-2024	River Scholar, RIVER (River-based ImmersiVe Education & Research) Field Studies Network, Instructor and Curriculum Professional Development Program. (Workshops, field instruction, river field trip to Flagstaff, AZ and San Juan River to practice field methods and safety).
2021-2027	Principal Investigator, At the Confluence: Supporting Critical Transitions for Graduate Students in Sustainable Watersheds Research, National Science Foundation ($1,500,000.00) with Rohan Benjankar, Alan Black, Carol Colaninno-Meeks, and Sharon Locke.

CURRICULUM DEVELOPMENT

2021-2023	"A Youth-Led Citizen Science Network for Community Environmental Assessment: Curriculum for High School Students." Editor: Charlie Blake. Part of Y-City Sci NSF iTEST Grant. Contributed to multiple lessons in five different units on soil, air, and noise pollution.
2019	GEOG 444: Drones for Mapping and Communication. Developed new undergraduate level drones course.
2016-2017	GEOG 417: River Landscapes. Developed new fluvial geomorphology course.
2016	GEOG 418: Geographic Information Systems. Developed new labs using local data for existing course.
2015	GEOG 573: GIS Modeling of the Natural Environment. Developed course for cross listing with ENSC 573.
2015	ENSC 220: Principles of Environmental Science. Developed online course for online administration every semester and in the summer.

SELECTED PEER REVIEWED PUBLICATIONS

2023 **Martinez, Adriana E.** and Martinez, Alejandra O. Inspiring the Next Generation: Teachers in the Field and Scientists in the Classroom. Science Scope. Accepted, in press.
efforts of seasonal wetlands along the Mississippi River," *Conservation and Society*, 17 (1): 73-83.

2018 AP GIS&T Study Group*, "Bridging High School and Introductory Undergraduate Courses in Geographic Information Science and Technology," *Journal of Geography*, 117 (4): 165-173.
*AAG Study Group for AP GIS&T included: Alqvist, O**,** Cassetta, D., Housel, J., Huyn, Niem, Keen, J., Luebbering, C., **Martinez, A.E**., Shultz, R., and Solem, M.

CONFERENCE PARTICIPATION & PRESENTATIONS

2023 **Martinez, Adriana E**. Panel: "Addressing Barriers to Minoritized Scholars' Advancement and Success in Physical Geography Fields," Annual conference of the American Association of Geographers, Denver, CO, March 23-26.

2022 **Martinez, Adriana E.** "SIUE's CAFÉ: BIPOC Inclusion through a Community for Advancing Faculty Equity." AGU Annual Conference. AGU LANDInG Academy invited presentation. Chicago, IL, December 11-16, 2022.

TEACHING EXPERIENCE- Southern Illinois University Edwardsville

Drones for Mapping and Communication, GEOG/ENSC 444, GIS Modeling the Natural Environment, ENSC/GEOG 573, Geographic Information Systems, GEOG 418, River Landscapes, GEOG 417, Geomorphology, GEOG 315, Introduction to Physical Geography, GEOG 210, Environmental Sciences Seminar I, ENSC 505, Environmental Sciences Seminar II, ENSC 506, Principles of Environmental Science, ENSC 220, Applied Research Methods, ENSC 210, Introduction to Physical Geology and Geography, ESCI 111

FACULTY DEVELOPMENT ACTIVITIES - Teaching

2023 "Being and Becoming in the Field: Student Negotiations of Belonging and Identity," RIVER Field Studies Network, January 26th.

2023 "Beneficial Risks: The Evolution of Risk Management for Outdoor and Experiential Education Programs," RIVER Field Studies Network, January 20th.

2022 Inclusive Pedagogy, Continuous Improvement Conference, March 18th

2022 Open Education Resources Workshop, SIUE Center for Faculty Development and Innovation, November 16th.

2022 The Racial Healing Handbook: Practical Activities to Help you Challenge Privilege, Confront Systemic Racism, and Engage in Collective Healing book club, Participant.

2021 Inclusive STEM Teaching Project Course, Inclusive STEM Teaching Project.

2021 Unintended and Hidden Biases Influence Over Faculty Evaluation Practice and Processes, Faculty Development Center, SIUE.

2020 Student Engagement in Synchronous Online Course Delivery, July 22, 2020.

Results from Prior EUE Support

2019: The Future of Mapping Technology: Upgrading to ArcGIS Pro $8,750

We are requesting funding to update the course GEOG 418 Geographic Information Systems to the latest major software change from ArcMap to ArcGIS Pro. Environmental Systems Research Institute (ESRI) is a major company that develops the premier software for mapping known as ArcGIS. Two years ago, ESRI completely overhauled their suite of mapping software and developed the new mapping program known as ArcGIS Pro. This new program is an online-based system for mapping and is significantly different from the ArcMap system previously used. In order to bring students up to date on the latest software and tools within the Arc system, we aim to first learn the new software and then update the associated labs to reflect the new system. By redesigning the course to ArcGIS Pro, we are ensuring that students are learning the latest technology and are completely prepared for the workforce where a growing number of employers are switching to the ArcGIS Pro system. This course is offered every semester and during the summer session. Geographic Information Systems instructs students in basic GIS techniques and tools and serves as the introductory course to a suite of courses in Geospatial Technologies that we offer in Geography. Topics in the course include: vector and raster data, projections, queries, geocoding, GPS, and spatial analysis. In addition, this is a foundational course that serves not only our major, but other SIUE students within engineering and the natural and social sciences. This course is one of three required courses for the GIS minor at SIUE.

Outcomes: We successfully upgraded to the new software and still use it today. Labs were updated and are also still used (in some form) today. This software is still the industry standard and students are prepared for the workforce when they finish the intro course. Now all Geography courses with regard to GIS have updated to the ArcGIS Pro software.

2017: Geospatial Technologies: Going from Global to Local with New Lab Development $8,000

We are requesting funding to develop and improve the labs associated with Geography (GEOG) 418: Geographic Information Systems, a computer based course in which students learn the basics behind map making using ESRI's software ArcMap. This course is offered every semester and during the summer session. Geographic Information Systems instructs students in basic GIS techniques and tools and serves as the introductory course to a suite of courses in Geospatial Technologies that we offer in Geography. Topics include: vector and raster data, projections, queries, geocoding, GPS, and spatial analysis. In addition, this course serves our major and is the prerequisite for many courses required for the GIS minor at SIUE. Throughout the course, students complete approximately 8 lab exercises to become familiar with the software. Current labs are a combination of lab exercises from GIS textbooks and online tutorials. We would like to develop a set of fully independent labs using local geographic data that specifically targets the course and lecture objectives and allows students to hone their writing and presentation skills. Such labs would better prepare students for the GIS workforce, increase familiarity with the local area, increase rigor, expose students to the latest techniques and create a unique course.

Outcomes: A version of these labs are still used today but have been updated to the newer version of the software (see above).

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE

MEMORANDUM

Date: February 14, 2024

To: Kevin Leonard, Dean of College of Arts and Sciences

From: Nicholas Guehlstorf, Professor and Chair

Subject: Dr. Adriana Martinez's Excellence in Undergraduate Education Grant

Dr. Adriana Martinez of the Department of Environmental Sciences and Geography & GIS has submitted a very encouraging and ambitious internal grant titled, "Environmental Equity: Integrating Justice and Inclusivity into *Principles of Environmental Science."* This brief memo is to summarize my evaluations of the proposal and support her efforts to make the Department more inclusive and technologically robust. Dr. Martinez has invested a great deal of effort in seeking teaching-focused grant funding, this is perhaps best demonstrated by receiving a National Science Foundation-funded GeoPATHs grant that provides undergraduate students greater access to field experiences and to study abroad opportunities. Notably, her teaching-related grants center Diversity Equity and Inclusion (DEI) in Science, Technology, Engineering and Math (STEM) education. This commitment to ensuring that diverse students in STEM have equitable access to innovations in technology and high impact practices is also showcased in Dr. Martinez's most recent Excellence in Undergraduate Education (EUE) proposal.

First, as Dr. Martinez explains in her narrative (through the use of three goals) she wants to develop new chapter reviews, quizzes and in accordance with her recent use of Open Educational Resources (OER) incorporate more Native American case studies in order to expand beyond Indigenous issues as an attempt to better explain environmental justice. Second, as Dr. Martinez notes in her grant, the course helps DEI success because Environmental Sciences (ENSC) 220: *Principles of Environmental Science* is a course required by the major but used for general education and reaches a large number of minoritized students, primarily African American. Thirdly, as mentioned in Martinez's promotion dossier the retention or DFW rates in Dr. Martinez's classes indicate that she has worked to facilitate student learning and success. DFW rates in her courses are generally consistent with DFW rates for courses taught at the same level in our department. For example, the DFW rate for on-line sections of ENSC 220 taught by Dr. Martinez is 20.21% and the DFW rate for all sections of ENSC 220 over the past three years has been 18.90%. I can only expect that her funded EUE grant will help in lowering than the three-year average for the course.

Dr. Martinez's commitment to including diverse voices and perspectives in her courses, including feminist and minority approaches challenges the white male dominated field of Environmental Sciences. I am in support of this grant and summer salary because it is needed for Martinez's commitment to ADEI in ENSC. Dr. Martinez's integration of high impact activities in an on-line course is a noteworthy achievement.

c: Dr. Adriana Martinez
Dr. Stacey Brown Amilian