Implementing Course Based Undergraduate Research Experiences (CUREs) across an Environmental Studies Curriculum

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1. Introduction

- Course Based Undergraduate Research Experiences (CUREs) are highly impactful methods of improving student achievement and retention (Bangera & Brownell, 2014).
- Lynn University placed CUREs throughout the Environmental Studies Major curriculum
  - At the lower division level CUREs are laboratory experiences guided by faculty in which students gather data for faculty research projects
  - At the upper division level, students design and execute social and natural science research projects that increase in length from 3 weeks to a full semester
  - Skills are taught throughout the curriculum. These skills are required to ensure success in designing a research project

Bangera, G., & Brownell, S. E. (2014). Course-based undergraduate research experiences can make scientific research more inclusive. *CBE—Life Sciences Education*, *13*(4), 602-606.

2. Skill-Building Across the Curriculum

Table 1: How CURE-essential skills are developed over the curriculum, culminating in student-designed final projects

Class	Literature Review	Scientific Method Training	Formal Research Project Proposal	Collect Data	Plot and Analyze Data	Computer Skills (Excel, GIS, etc.)	Field/Lab/Survey Techniques	Scientific Writing	Full Project
ENV 130: Human Environment Interactions		x		x			x		
SCI 130: Chemistry 1				x			x		
SCI 110: Biology 1		x	x	x		x	x	x	
DSL 100: Scientific Literacy		x						x	
SOC 200: Research Methods in Social Sciences		x	x				x		
DSL 200: Scientific Literacy	x	x		x				x	
DQR 200: Statistics					x	x			
ENV 250: Environmental Risk and Public Health			x	x	x		x		
ENV 330: Wildlife Conservation				x			x		
ENV 340: Environmental Statistics		x		x	x	x	x	x	x
POL 385: Global Environmental Policy & Justice	x		x	x	x		x		x
ENV 420: Geographic Information Systems				x	x	x		x	x
ENV 450: Capstone in Environmental Studies	x		x	x	x			x	x

3. Lower-Division CUREs

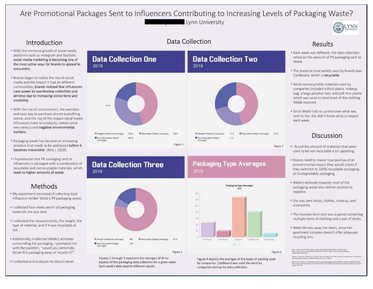
Freshman: Artifact Cleaning and Analysis

- ENV 130, the first semester class
- Students clean and sort artifacts from the summer archeology dig led by faculty
- Students discuss how differing abundances of artifacts during different time periods are indicative of social or environmental change

Sophomore: Bacterial Tolerance Studies

- ENV 250, second year spring class
- Students perform a halotolerance or other tolerance study of bacteria collected from the environment as part of a faculty research project
- Data are used to interpret abundances of bacteria found in the environment

4. Upper-Division CUREs



Junior: Authentic Data Analysis

- ENV 340, second semester spring class
- Students access various international and governmental databases on which to perform statistical analyses
- In the final project students collect data on their own or from a database to test a hypothesis

Senior: Capstone Research Project

- ENV 450, final semester before graduating
- Students spend 3 weeks designing a research project in natural or social sciences, 8 weeks executing the project, and the remaining time creating a final report and presentation
- Workshop style class sessions work to further a student's progress on their own research