Integrating Research and Teaching through Authentic Learning Experiences

Heather Vance-Chalcraft, Dept of Biology, vancechalcrafth@ecu.edu

ECU

Research Overview

My research focuses on strategies to improve:

- student engagement
- scientific literacy
- development of research and team science competencies

Particularly through:

- community-engaged learning opportunities
- student exposure to authentic research

Integration of Research with Teaching

I am interested in the impacts on students of collaborating with, or contributing to, the community.

Example: We found that service-learning in a plant biology course benefits students, the university, the city, and the environment.
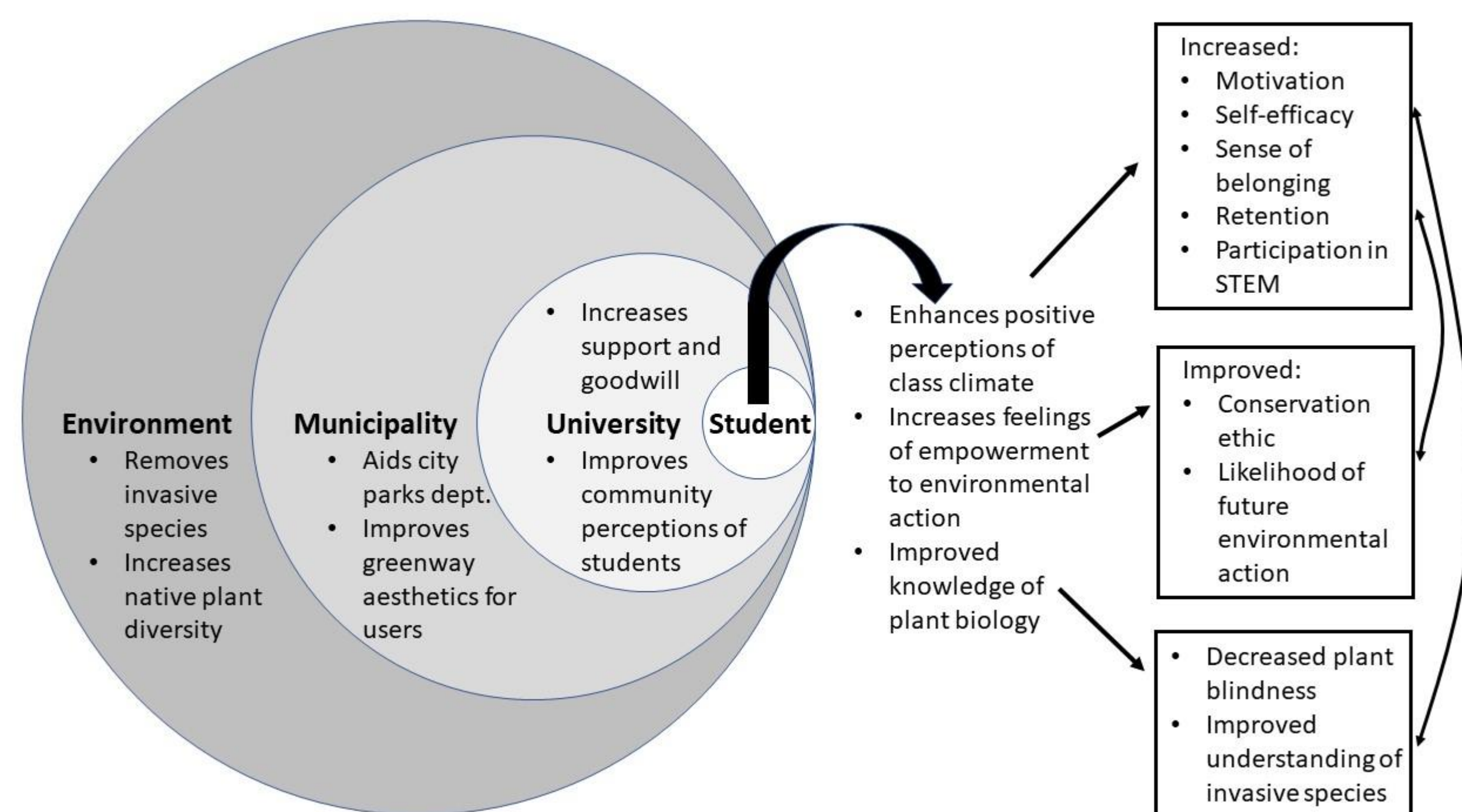
Students in my Scientific Communication class (Biol 3010) worked with the Museum of Natural Sciences Greenville location to create informational materials that will accompany six Museum exhibits. This service-learning and writing-intensive course uses this community partnership to engage students in a real-world task that also benefits the Museum.

NORTH CAROLINA Museum of Natural Sciences
GREENVILLE | CONTENTNEA CREEK
a time for science

Using Citizen and Community Science to Transform Learning

The Undergraduate Student Experiences with C* Science Network, in which the C* includes both community and citizen science, strives to create a diverse community of practice among instructors invested in using these approaches to engage students in authentic science practices, improve student learning outcomes, and broaden participation in science. I am Principal Investigator of this National Science Foundation supported Network.

Citizen Science in Postsecondary Education: Current Practices and Knowledge Gaps

HEATHER D. VANCE-CHALCRAFT, ALLEN H. HURLBERT, JENNIFER NESBITT STYRSKY, TERRY A. GATES, GILLIAN BOWSER, COLLEEN B. HITCHCOCK, MICHELLE ANNE REYES, AND CAREN B. COOPER

NSF

The Network also facilitates research on the best practices and impacts of citizen science and community science approaches. For example, I coordinated a project in which faculty at three universities incorporated the same citizen science project and assessment into biology courses to determine the impact of citizen science on student scientific literacy. Over five semesters, more than 1200 students participated in a pre- and post- knowledge assessment, with a subset of students completing written reflections. We found that students showed significant knowledge gains about topics related to the citizen science project. The student reflections revealed other benefits too.

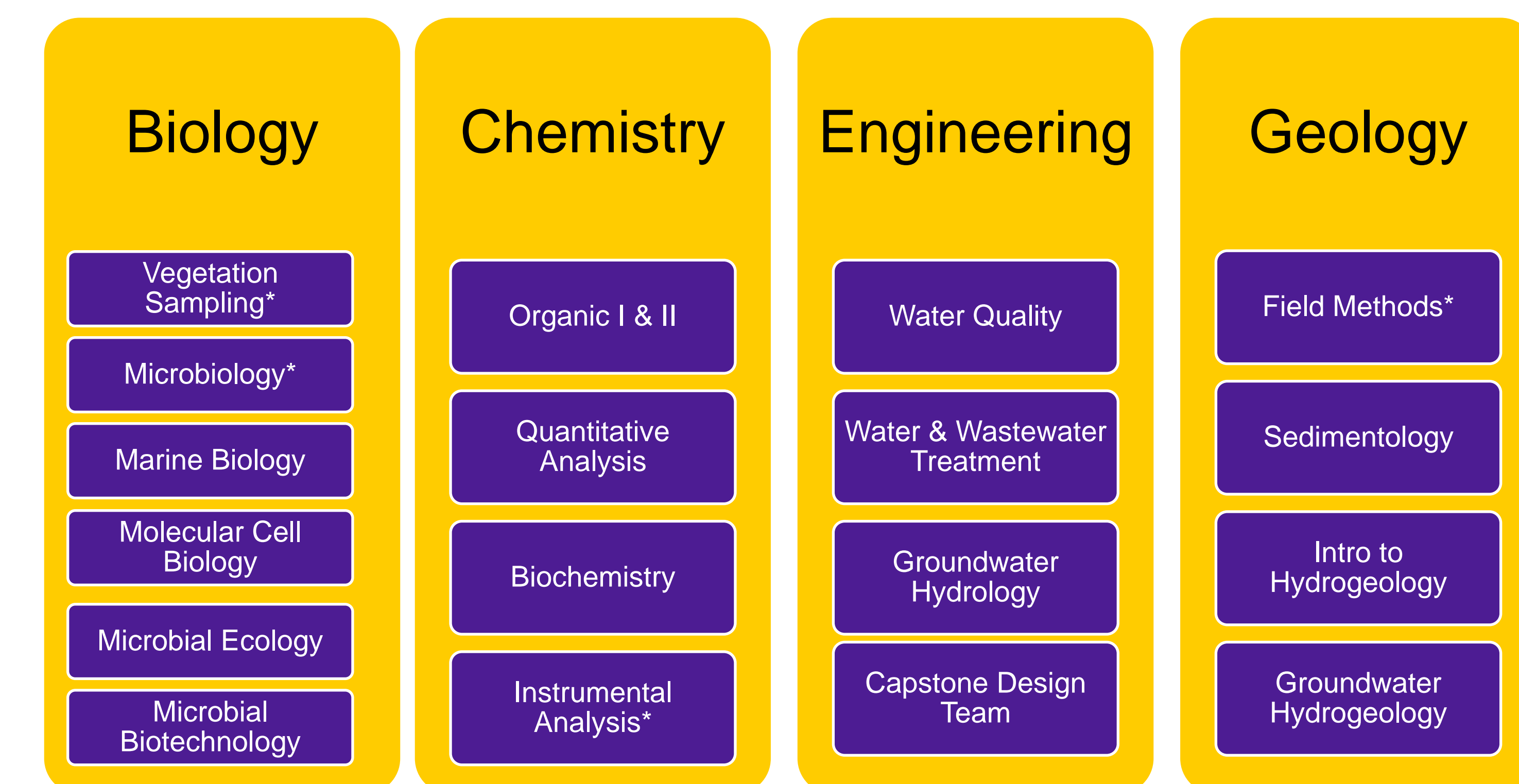| Benefits to the student	Benefits to the environment	Benefits to the community	Data benefits
• Reinforced class concepts • Provided hands-on opportunities • Changed student's perceptions of science • Enjoyed it	• Greater appreciation of nature • Increased environmental awareness • Motivation for environmental action	• Contributed to science • Made a difference in the community • Brought people together who had similar interests	• More data can be collected • Data can be collected over a larger geographic area • Scientific discoveries can be made more quickly

"I think citizen science projects help people outside the STEM field realize the importance of science and recognize some current environmental issues. If everyone did this project, they would realize – like I did – that climate change is affecting more right now than we think about on a daily basis."
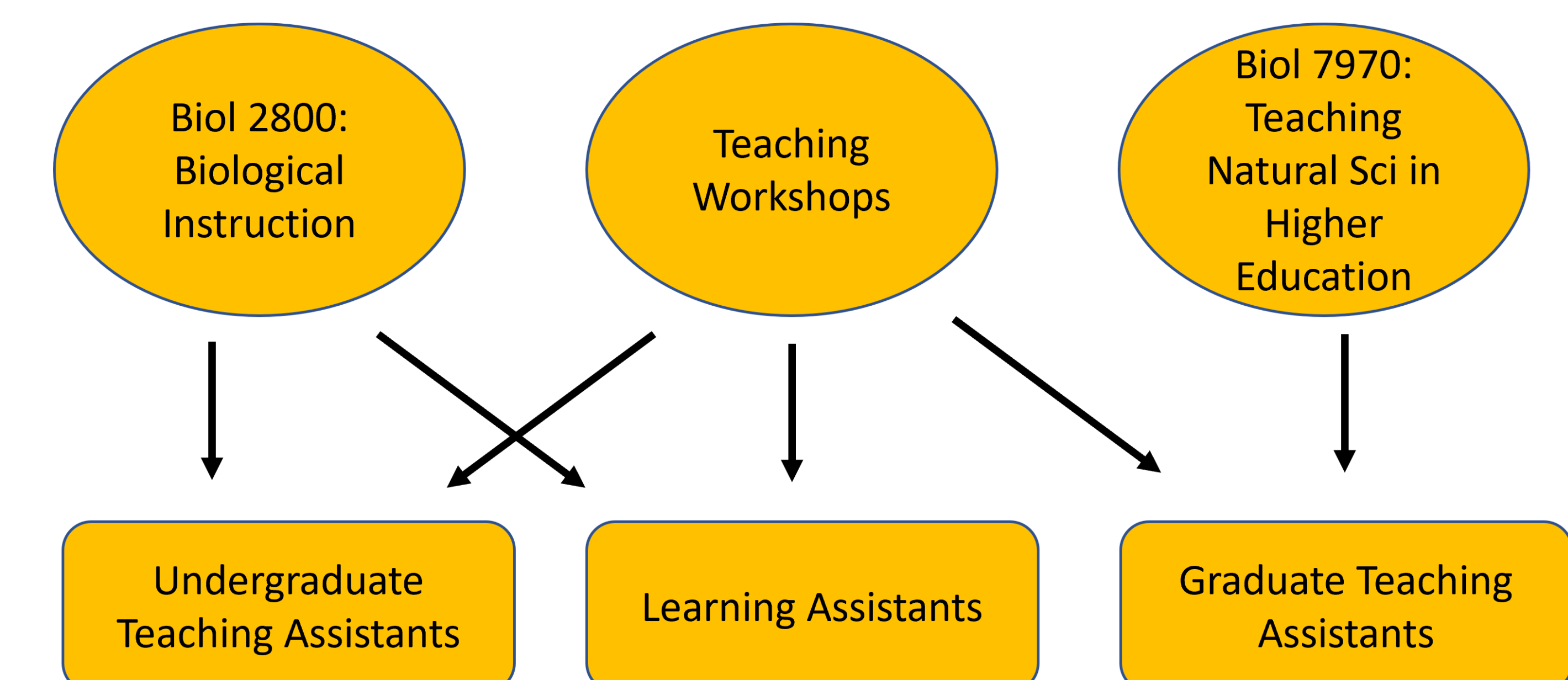

Incorporating Team Science Strategies into CUREs

Collaborative teamwork is fundamental to successful research and work across industries and is a desirable skillset for employers. Yet, students receive little training in how to effectively work in teams (Team Science). We are implementing Team Science training in course-based undergraduate research experiences (CUREs) to support the development of transportable team competencies (knowledge, skills, and attitudes) in undergraduates.

Biology	Chemistry	Engineering	Geology
Vegetation Sampling*	Organic I & II	Water Quality	Field Methods*
Microbiology*	Quantitative Analysis	Water & Wastewater Treatment	Sedimentology
Marine Biology	Biochemistry	Groundwater Hydrology	Intro to Hydrogeology
Molecular Cell Biology	Instrumental Analysis*	Capstone Design Team	Groundwater Hydrogeology
Microbial Ecology			
Microbial Biotechnology			

Professional Development for Teaching Assistants

- Biol 2800: Biological Instruction
- Teaching Workshops
- Biol 7970: Teaching Natural Sci in Higher Education

- Undergraduate Teaching Assistants
- Learning Assistants
- Graduate Teaching Assistants

Lab Website

Vancechalcraftlab.com