



Introductory Lab (Pre-CUREs)

- All freshmen biology majors take these courses and gain fundamental skills for course-based undergraduate research experience (CURE) courses
- Ecology is not required for all biology majors at East Carolina University
- 85% of students want to attend medical school

Research Experience Importance:

Problem: Undergraduates benefit from research experiences, but lack the skills (quantitative & communication) necessary to properly engage in research

Solution: Engage students early in pre-CURES or mini-CURES using large data research projects such as citizen science projects

Citizen Science Pre-CURE Course

Vision and Change Core Competencies:

- Ability to apply the process of science
- Ability to use quantitative reasoning
- Ability to communicate and collaborate with other disciplines
- Ability to understand the relationship between science and society

Learning Objectives:

- 1) Design an experiment to test a hypothesis by collecting data from the nature environment
- 2) Analyzing group data and data from Project Budburst using a statistical test, and developing and interpreting graphs
- 3) Presenting a group poster, and writing an individual scientific paper
- 4) Connect work to climate change

Choosing a citizen science project

- Project that can work across semesters with large number of students (360 students per semester)
- Has to be completed on campus

Curriculum Development

- Developed and validated rubrics, student documents, minimum requirements for projects
- TA documents and training (Semester & Weekly)

Pathway of Growth during Ecology Section

Research Project with Budburst

First Step:

Students determine

- Research question
- Choose Phenophase
- Tree species to study
- Abiotic Condition (Temperature, rainfall, etc)

Done individually and then as a group

Fall



Second Step:

After TA approval

- Students collect data on campus and from Budburst (4 weeks)
- Analyze data in R
- Produce group scientific poster
- Individual scientific papers

Phenophase

Observable phase in annual life cycle of trees.

Examples: Leaf fall, Color change, 1st Flower, Full Flower, Budburst, Full Leaf

Final Step:

Peer Review Occurs

- Posters
- Individual Papers (ADI methods for peer review)
- Poster Presentation during last class

Spring



Foundational Subjects (Weekly Subjects)

Citizen Science, Ecology, Tree Identification, Climate Change/Weather, Statistics, Learning to use R, Writing Scientific Papers, Designing Scientific Poster

Teaching Assistant Challenges

- **Not expert in statistics/tree identification**
 - Detailed TA documents & study material
- **Managing students and groups**
 - Allow TAs to form groups
- **First time teaching as TA and/or course**
 - Support system from experienced TAs and lab managers
- **Maintaining balance between teaching and graduate school**
 - Realistic timeframe for preparing and grading assignments

Undergraduate Challenges

- **Group Work**
 - Not all students contribute the same or collect data for project
 - Peer Review self and others throughout project
 - Individual assignment
- **Statistics and using RStudio**
 - Use R markdown files
- **Writing Scientific Papers**
 - Examples and Peer Review
 - Use of the ECU Writing Center