LESSON PLAN

Course: Principles of Ecology Laboratory

Lesson Title: Spatial Distribution & Analysis 2-week lab (180 minutes each week)

Lab TA Prep Work:

- Post materials for your sections and make any necessary edits to the PowerPoint presentation
- Prepare a short quiz for students to take at the start of the class (students should be allowed to use one-page of *HANDWRITTEN* notes they may not print out the materials and use those)
- Review this lesson plan and student prep work and be prepared to facilitate discussion with students

Student Prep Work:

- Short Videos
 - Species distribution types: <u>https://youtu.be/BMsmDy-2jbA</u>
 - (Approximately 4 min; Source: Great Pacific Media)
 - Intro to ArcMap: <u>https://youtu.be/hqHCJUudPvs</u>
 - (Approximately 2 min; Source: UTM Library)
- Complete the Mid-Semester Feedback Quiz on Canvas

Student Learning Outcomes (SLOs)

By the end of this class, students will be able to:

- 1. Describe the three types of species distributions and infer the abiotic and biotic interactions that may influence why species exhibit each distribution type
- 2. Calculate the spatial distribution of southern live oaks (*Quercus virginiana*) using two different field-sampling technique and matching statistical analyses.
- 3. Compare the field-sampling and analysis techniques to using advanced spatial analysis tools like ArcMap
- 4. Determine how spatial scale influences dispersion patterns when using field-sampling techniques and spatial analysis tools.

	Activity/Procedures	Materials/	Assessment
		Notes	
SLO1	• Quiz (10 min)	PPT	PLQ
	• Mini-lesson (10 min): introduce the concept of		
	spatial dispersion and specifically focus on the T-		
	square method		
Time: 20			
minutes			
SLO2	• Data Collection - Walk the students to the USF	Data collection	Data will be
	Geopark and instruct them on completing the two	sheet &	included in
	field-based sampling methods (density & T-	instructions	next week's
	square)		lab and the
		Transect tape,	PLR (rubric
		DBH tape,	below)
		flags, quadrat,	
Time: 150		clipboard	
minutes			
Flex	• Summary (10 minutes): Be sure to collect all	Canvas	
Time: 10	the data and highlight that analyses will be		
minutes	done next week		

	Activity/Procedures	Materials/	Assessment
		Notes	
SLO1 + SLO2	• Mini-lesson (10 min): Remind students about the different dispersion patterns & field methods for determining which patterns species have	PPT	
_			
Time: 10			
minutes			
SLO2 + SLO4	• Data Analysis (90 min): have students work	Data analysis	Figures and
	with the datasets to create new layer and maps in	worksheet	data analysis
	ArcGIS		will be
		Excel	included in
		workbook	PLR (rubric
		with	below)
		dispersion	
Time: 90		data	
minutes			
SLO3 + SLO4	Guided Practice (30 min): Walk students	PPT	Nearest
	through how to open the Spatial Analysis map		neighbor
Time: 70	in ArcMAP: introduce the Table of Contents.	ArcMAP	analyses will
minutes	Lavers, Symbology Tab, and Statistical		be included
	toolboxes (Make sure they enable the "Spatial	Data Analysis	in PLR
	Analysis" tool)	Worksheet	(rubric
	• Data Analysis (40 min).	() officiely	(rubite below)
Flex	• Summary (10 minutes): Reiterate important	Canvas	
Time 10	points about dispersion patterns and	Curras	
minutes	differences between field methods and		
	analysis in ArcMAP		

Week 2: Field Data Analysis & ArcMap Activity

CATEGORY	5	4	3	2	1
Hypothesis Formation + Thought Questions	Highly proficient formulation of a prediction given the background information provided; all thought questions are answered.	Proficient formulation of a prediction given the background information provided; all thought questions are answered.	Sufficient formulation of a prediction; most thought questions are answered.	Some attempt at formulation of a prediction OR answering the other thought questions.	Missing prediction and/or thought questions.
Data Analysis – Field Methods	Highly proficient formatting of your field map. Accurate calculation of the Index of Spatial Dispersion (C) and p-value. Figure captions are concise and include background information and the main result.	Proficient formatting of your field map. Accurate calculation of the Index of Spatial Dispersion (C) and p-value. Figure captions include background information and the main result.	Sufficient presentation of your field map. The Index of Spatial Dispersion (C) and p-value are calculated. Figure captions are included.	Missing any of the following: field map, C or p-values, or figure captions.	Missing any data analysis for the field methods.
Data Analysis - ArcMAP	Highly proficient formatting of summary statistics. Accurate calculation of the NNRatio & p-value. Table captions are concise and include background information and the main result.	Proficient formatting of summary statistics. Accurate calculation of the NNRatio & p- value. Table captions include background information and the main result.	Sufficient formatting of summary statistics. The NNRatio and p-value are calculated. Table captions are included.	Missing any of the following: NNratios, p- values, or table captions.	Missing any data analysis in ArcMAP.

	The conclusion	The conclusion	The conclusion	There is some	Missing any
	provides an	provides an	provides a	attempt to	summary of
	insightful summary	accurate summary	sufficient	summarize	the results of
	of the investigation	of the investigation	summary of the	the	the
	and directly	and adequately	investigation	investigation	investigation.
Conclusions +	connects to the	connects to the	and attempts to	that may or	
Summary	generated	research	relate to the	may not	
Questions	hypotheses	hypotheses and	generated	relate to the	
	incorporating the	results. P-values	hypotheses and	research	
	results. P-values	and figures are in	results.	hypotheses	
	and figures are also	some way		and results.	
	correctly	referenced.			
	referenced.				