EVR1001L Introduction to Environmental Science Lab (Virtual Lab; Online only) Fall 2018

Welcome to EVR1001L online! This course allows you to conduct environmental science experiments in a virtual reality (Second Life) that we cannot possibly offer in a laboratory building. You can go back and forth in time, travel to Antarctica, and conduct experiments on a virtual coral reef!

Please pay close attention to the course schedule (in the body of the syllabus below), especially the need to get registered for the lab sessions as soon as possible. The first lab starts on Sept. 3!

Some students have trouble running Second Life on their laptops, especially using shared Wi-Fi, and we suggest using PC computers at the libraries that are plugged directly to the internet. Select the "multimedia desktop" at login to access Second Life. This software is available on all of the computer stations in Strozier and Dirac, along with the Excel spreadsheet program that you need to make the data graphs.

IMPORTANT DATES:

Week 1: Aug. 27-31, 2018

- First Day attendance is not used for online classes.
- Create your account with Pearson (from the MyLab and Mastering link on the Canvas course site). You can pay for the required access code, or enter the code you bought at the FSU bookstore.
- Click the Second Life Virtual Field Trips link on the Mastering course site to register with CNDG and select your lab session.
- Please use your full name (the name you use with FSU) and your FSU email address when you register with Pearson and CNDG so the grade books will line up properly.
- If you have trouble registering, capture screen shots of the page you were on, what you clicked, and what error screen you got and send them to me (wlanding@fsu.edu).
- Complete the Second Life Orientation ASAP.
- Thursday, Aug. 30, 2018: Last day to drop courses. I will not drop anyone automatically. You have to drop yourself.

Week 2: Sept. 3-9, 2018

- Lab 1 (Easter Island) opens. You have to complete the Second Life Orientation before you can enter the virtual labs.
- You have to get a 90% score on the pre-lab quiz (in the MyLab and Mastering Assignments) before you can start. All of the pre-lab reading material you need for each lab is in one of the Modules on the Canvas course site
- Lab 1 original reports are due Sunday evening Sept. 9, 2018.

Week 3: Sept. 10-16, 2018

- Lab 1 remains open until Friday Sept. 14.
- Revised reports are due Sunday Sept. 16.
- We only use the higher scores between your original and revised reports to calculate your grades.

The rest of the schedule is listed in the body of the syllabus below.

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EVR1001L is the companion laboratory course for EVR1001 (lecture version) and EVR1001 (online version). Instead of a physical laboratory space, EVR1001L will use the "Second Life" virtual reality environment to give you access to "realities" that we cannot provide in a physical laboratory.

This Syllabus is subject to change and you will be notified via Announcements on the course Canvas web site and by your FSU email, so check your FSU email every day. You are responsible for everything in this Syllabus, and for keeping track of the lab schedule and lab report due dates.

First Day Attendance Policy: **Because this is an online-only course, and because people will add the course during the first week of the semester, we cannot use The First Day Attendance procedure. If you decide you do not want to take the course, you must drop the course yourself during the Drop/Add period.**

Instructor	Office	Office Hours	Phone	Email
Prof. William Landing	325 OSB	T, Th 1:00-3:00PM	850-644-6037	wlanding@fsu.edu

TAs: The TAs serve as your "designated mentors" for this course. They are standing by to help you get the most out of this course. They will also be grading your lab reports and offering suggestions for improvement to get a better score.

EVR1001L TAs			
TA Name	Email Address	Office Hours	Student Names
Sean Buchanan	stb14@my.fsu.edu	Thrs. 12:00-2:00pm; Fri. 10:00-12:00	Acevedo-Cleary
Xu Chen	xc11@my.fsu.edu	Mon. 2:00-6:00pm	Clem-Gallagher
Chris Malinowski	cmalinowski@fsu.edu	Wed. 12:00-4:00pm	Garcia-Johnson
Nicole Morgan	nb11h@my.fsu.edu	Wed. 8:00-10:00; Thrs. 8:00-10:00	Johnston-Morilak
Rachel Petet	rap17d@my.fsu.edu	Mon. 12:00-2:00pm; Fri. 12:00-2:00pm	Morley-Santiago
Morgan Shaner	ms18ad@my.fsu.edu	Tues. 4:00-6:00pm; Thrs. 4:00-6:00pm	Sapp-Tighe
Arvind Shantharam	aks12c@my.fsu.edu	Wed. 10:00-12:00; Thrs. 10:00-12:00	Tobin-Zukoski

Computer Competency: EVR1001L is a fully online course, requiring you to register and complete the course using a computer. This course meets the requirements for Computer Competency and Computer Competency accounts for 40% of the grade for each lab. For each lab, there are instructions and videos posted in the Modules tabs that explain how to create the data tables, how to perform the necessary calculations, and how to make the graphs. Your TAs will grade your reports, making comments on your text, data tables and graphs, and you are expected to work with them to obtain a higher score on your revised reports. You must earn at least a C- (69.5% overall average% score) in this course to get the Computer Competency credit.

Liberal Studies For The 21st Century:
The Liberal Studies for the 21st Century Program at Florida State University builds an educational foundation that will enable FSU graduates to thrive both intellectually and materially and to support themselves, their families, and their communities through a broad and critical engagement with the world in which they live and work. Liberal Studies thus offers a transformative experience. This course has been approved for the Liberal Studies disciplinary requirement of Scientific Method and Reasoning and thus is designed to help you become a critical appraiser of theories and the facts that support them.

Purpose/Objectives. At the end of this class, students will:
1. be able to describe the relationships between components of the natural world and the effect of the built world upon it.
2. be able to analyze environmental problems and identify the risks caused by them.
3. have a basic knowledge of hazardous materials.
4. investigate and report on basic concepts of air and water pollution, especially nutrient pollution.

5. be able to describe solid and liquid waste disposal and treatment issues.

Scientific Method and Reasoning. Students will learn how to:

1. Think critically and cogently about causal relationships with scientific reasoning.
2. Assess previous experimentation and published scientific results.
3. Critically examine and evaluate scientific observation, hypothesis or model construction,
4. Articulate a variety of issues created by the complex interactions among science, technology, and society.
5. Use scientific perspectives to evaluate contemporary problems facing society.
6. Explain the process of scientific reasoning and apply scientific principles inside and outside of the laboratory or field setting.
7. Systematically evaluate data for accuracy, limitations, and relevance, and identify alternative interpretations of the data.
8. Design and conduct experiments to make observations and test hypotheses, as well as to analyze and interpret data using quantitative and appropriate technological tools.

These competencies will be evaluated through your completion of 8 laboratory modules. Pre and post-laboratory exercises and the lab module activities will be completed within the FSU Canvas and the Second Life virtual reality systems. The laboratory modules are completed in the Second Life virtual environment, each requiring slightly different data collection and recording tasks. As you work on each lab, make sure to write down your results in a lab book as you go along. You will then enter your data to create data tables and data plots using Excel spreadsheet software. You will perform calculations using Excel, including means and standard deviations and statistical tests. You will merge your own data with existing data sets to evaluate trends and patterns in long time series environmental data. You will generate various types of graphs (bar, line, scatter). You will create relatively short lab reports explaining what you did in each lab, what calculations were conducted, and include your data tables and graphs.

Course Web Sites: All materials for the laboratory modules, including pre-lab reading and quiz materials will be presented through the FSU Canvas system, the Pearson MyLab and Mastering web site, the CNDG web site, and the Second Life virtual reality environment.
Once you are registered with CNDG for Second Life access, you can log directly into Second Life from any computer that has the Second Life software installed. Make sure you have a good internet connection. The computers in the libraries work great. Shared Wi-Fi does not.
Please note that students who have taken any courses from CNDG in the past should update the version of Second Life on their personal computers/laptops to the latest and most stable EDU viewer. The download links for these can be found on the my.cndg.info dashboard, in the Orientation guide, and are also shown below. DO NOT download the Second Life software from any other source.
Second Life EDU viewer for Windows:
https://cdn.campus.cndg.info/software/Second_Life_edu_5_0_9_329906_i686_Setup.exe
Second Life EDU viewer for Mac:
https://cdn.campus.cndg.info/software/Second_Life_edu_5_0_9_329906_i386.dmg

You can check your CNDG registration status, download data reports, and access Second Life by logging into https://my.cndg.info/
If you have trouble logging into Second life, or working within Second Life, you can get help by emailing help@cndg.info. Do not ask the Second Life IT people for help because they don't know anything about this course!

Required Textbook and Online Access Code: **You must purchase an access code directly from Pearson or from the FSU Bookstore.** Other products (with different ISBN numbers) that are available through Amazon are not the same. If you are also enrolled in EVR1001 (lecture or online versions), any of these purchases will fulfill the textbook and access code requirements for both courses.

- Buy direct from Pearson: When you first click on the MyLab and Mastering link from the Canvas course site you will be asked to establish an account (please use your full name and FSU email address) and if you want to pay for an access code using a credit card. This will also include access to the e-text (no hard-copy textbook is required).
- FSU Bookstore: Standalone Access code- ISBN 9781323911112
- FSU Bookstore: Access code + Loose-leaf textbook – ISBN 9781323907795

Computer and Internet Requirements: When you register with CNDG for Second Life (instructions below), you will be prompted to install the Second Life software. The program will run well on an Ethernet (wired) internet connection, but not very well on a slow, shared Wi-Fi connection (like at Starbucks). There are hundreds of computers in Strozier and Dirac libraries where you can log directly into your Second Life account using the username and password you set up when you register with CNDG.

The Second Life software can be "clunky". You need a fast internet connection (such as on the library computers). If it freezes or seems to fail, it is often because your internet connection is too slow, or because you are using shared Wi-Fi that can be intermittent. If the signal is dropped even for a microsecond, Second Life thinks you have logged out. The first thing to check is to log out, then log back in on a better internet connection. You should not need to change your username or password. If you cannot seem to make it work on a library computer, record exactly what the problem is (with screen shots) and send an email to help@cndg.info.

You will also need word processing and spreadsheet software. Microsoft Word and Excel programs are recommended. These programs are available at no cost from the FSU IT department (http://its.fsu.edu/student-essentials). You will need a fully-functional version of Excel but the MAC version from FSU IT is not fully functional. If you use a MAC laptop or desktop computer, you should use a computer in the library that has Excel on it, or use the Excel software available from FSU Virtual Lab web site (http://its.fsu.edu/service-catalog/end-point-computing/myfsuvlab) The methods for uploading/downloading files and to copy/paste content between the FSU Virtual Lab applications and your own computer are explained here: http://faq.its.fsu.edu/computing/computer-labs/myfsuvlab

If you are not familiar with using spreadsheet software to plot data, you should practice making graphs during Week 1 and Week 2. See the Week 1 Excel practice assignment in Canvas. There are also postings for each lab module (in the Modules tab) that explain how to create the data tables (in Word or Excel) and graphs (in Excel) for each lab. As you work on each lab module, your TAs will be available to assist if you have trouble understanding the data tables and graphing requirements.

Week 1 -- Registering for Mastering Environmental Science: A screen shot registering guide file showing how to register with Pearson and CNDG is posted on the Canvas Syllabus tab. During the first week, you will need to register first with Pearson MyLab and Mastering and then with CNDG (for the Second Life system). This is two separate registrations, and you have to register with Pearson first. Make sure you have a good internet connection because even momentary Wi-Fi interruptions will interfere with the registration. An Ethernet cable internet connection is the best option. Remember that there are hundreds of computers at the libraries with the necessary software and fast internet connections.

If you have any difficulty getting registered with Pearson or CNDG, make a note of which page of the registration guide you were on, which link you clicked, save a screen shot of any error message you get, and email this to wlanding@fsu.edu so we can try to fix the problem.

Second Life Lab Sessions: During CNDG Registration, you can choose any available lab session to attend the Orientation and the online laboratory modules. The lab sessions listed below are when Prof. Landing and/or

one of the course TAs will also be in the lab to answer questions. You are expected to do the labs in that same session every week. You will be grouped with up to 20 of your fellow students. You can work with other students within Second Life but this is not a requirement. You can complete the labs during any of the times the labs are available, but you will have lower priority if you log in during other sessions. You can also complete the labs on evenings and weekends but there may not be a TA/mentor in the environment to answer questions. Staff from CNDG will also be in the labs every weekday until 8:00PM to help. Due to required maintenance, the Second Life labs will not be available from 00:00-12:00 Monday and 00:00-12:00 Tuesday (midnight to noon). Labs will "Close" at 8:00PM on Friday of the 2nd week for each lab.

EVR1001L Fall 2018 Lab Time Slots					
	Monday	Tuesday	Wednesday	Thursday	Friday
08:00-10:00	labs closed	labs closed	Nicole	Nicole	
10:00-12:00	labs closed	labs closed	Arvind	Arvind	Sean
12:00-2:00PM	Rachel		Chris	Sean	Rachel
2:00-4:00PM	Xu		Chris		
4:00-6:00PM	Xu	Morgan		Morgan	

Week 1-2 Second Life Orientation: Once you are properly registered with CNDG and have the necessary software installed on your computer, you will be invited to do an Orientation inside Second Life. A screen shot file on the Orientation process is posted in the Canvas Syllabus tab. You cannot continue into the laboratory modules until you complete the Orientation to Second Life.

Week 2-3 – Lab 1: Easter Island: The first lab module on population growth and deforestation on Easter Island will be available after 12:00 noon on Monday Sept. 3, 2018. You must read the pre-lab study materials, then pass a short quiz before starting the lab (90% score required). The reading assignments, quiz questions, and a lab report template are posted in the Canvas Modules tab for each lab. For practice, the quiz questions that you will need to answer when you attempt to do a lab in Second Life are posted in an assignment on the MyLab and Mastering site. Use the pre-lab readings and videos to find the answers to the questions before you attempt a lab in Second Life. Then, as you work on each lab, make sure to write down your results in a lab book as you go along. Your original report for Lab 1 is due by midnight Sunday Sept. 9, 2018. Your revised report is due by midnight Sunday one week later, but the labs will close on Fridays at 8:00PM at the end of the 2nd week for each lab, so you cannot wait until the last Sunday to attempt the lab. The Due Dates will be strictly enforced.

You must complete the lab modules and submit your lab reports according to the schedule below. Because of technical limitations, each lab will only be available for the one or two week period shown in the schedule below. A missed laboratory will result in a zero score. **No Make Up labs will be offered.** You must contact the instructor or your TA in advance if you will miss a laboratory so that we can try to make alternative arrangements. If you get sick, get arrested, wreck your car, have to go out of town, become hospitalized, etc. contact the Instructor by email or phone before you miss a lab!! Do not tell us AFTER you miss a lab; tell us BEFORE you think you will miss a lab. If you miss a lab without an excused absence and without telling us in advance, you will get a zero.

Submitting Lab Reports: There will be two Turnitin "assignments" for each lab. The first Assignment link will be for your original submission. The TAs will grade your reports and offer ways to get a better score if you want to revise your reports. The 2nd assignment link will be for your revised report. You are welcome to work on the lab reports with other students, but you must "use your own words" for your lab reports. Each lab report will be checked for plagiarism using Turnitin. Cases of plagiarism will be reported to the FSU Honor Code committee and may result in serious sanctions. Don't plagiarize!

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EVR1001L Environmental Science Laboratory Schedule: Fall 2018

EVR1001L-0001 Environmental Science Laboratory (Online)						
Fall 2018						
August	27	Mon	First Class Day	Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	28	Tue		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	29	Wed		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	30	Thu		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	31	Fri		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
September	1	Sat		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	2	Sun		Mastering and CNDG/Second Life Registration	Second Life Orientation	Sign ups for Lab Sessions
	3	Mon	Labor Day	Lab 1: Easter Island opens		
	4	Tue				
	5	Wed				
	6	Thu				
	7	Fri				
	8	Sat				
	9	Sun			Lab 1 report due	
	10	Mon				
	11	Tue				
	12	Wed				
	13	Thu				
	14	Fri		Lab 1: Easter Island closes		
	15	Sat				
	16	Sun			Lab 1 revisions due	
	17	Mon		Lab 2: Ice cores and Climate Change opens		
	18	Tue				
	19	Wed				
	20	Thu				
	21	Fri				
	22	Sat				
	23	Sun			Lab 2 reports due	
	24	Mon				
	25	Tue				
	26	Wed				
	27	Thu				
	28	Fri		Lab 2: Ice cores and Climate Change closes		
	29	Sat				
	30	Sun			Lab 2 revisions due	
October	1	Mon		Lab 3: Ocean acidification opens		
	2	Tue				
	3	Wed				
	4	Thu				
	5	Fri				
	6	Sat				
	7	Sun			Lab 3 reports due	
	8	Mon				
	9	Tue				
	10	Wed				
	11	Thu				
	12	Fri		Lab 3: Ocean acidification closes		
	13	Sat				
	14	Sun			Lab 3 revisions due	
	15	Mon		Lab 4: Invasive Species - Lion Fish opens		
	16	Tue				
	17	Wed				
	18	Thu				
	19	Fri				
	20	Sat				
	21	Sun			Lab 4 reports due	
	22	Mon				
	23	Tue				
	24	Wed				
	25	Thu				
	26	Fri		Lab 4: Invasive Species - Lion Fish closes		
	27	Sat				
	28	Sun			Lab 4 revisions due	
	29	Mon		Lab 5: Frogs and atrazine opens		
	30	Tue				
	31	Wed				
November	1	Thu				
	2	Fri				
	3	Sat				
	4	Sun			Lab 5 reports due	
	5	Mon				
	6	Tue				
	7	Wed				
	8	Thu				
	9	Fri		Lab 5: Frogs and atrazine closes		
	10	Sat				
	11	Sun			Lab 5 revisions due	
	12	Mon	Veteran's Day	Lab 6: Nutrient use on a farm opens		
	13	Tue				
	14	Wed				
	15	Thu				
	16	Fri				
	17	Sat				
	18	Sun			Lab 6 reports due	
	19	Mon				
	20	Tue				
	21	Wed	Thanksgiving			
	22	Thu	Thanksgiving			
	23	Fri	Thanksgiving	Lab 6: Nutrient use on a farm closes		
	24	Sat				
	25	Sun			Lab 6 revisions due	
	26	Mon		Lab 7: Nutrient effects on a watershed opens		
	27	Tue				
	28	Wed				
	29	Thu				
	30	Fri				
December	1	Sat				
	2	Sun			Lab 7 reports due	
	3	Mon		Lab 8: Green building - Carbon footprint opens		
	4	Tue				
	5	Wed				
	6	Thu				
	7	Fri		Lab 7: Nutrient effects on a watershed closes		
	8	Sat				
	9	Sun			Lab 7 revisions due; Lab 8 reports due	
	10	Mon	Finals Week			
	11	Tue				
	12	Wed				
	13	Thu				
	14	Fri		Lab 8: Green building - Carbon footprint closes	Lab 8 revisions due	

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Evaluation/Grading Procedure: There are no exams. Your highest lab report scores (the higher scores between your original and your revised reports) for the 8 Second Life lab modules will be averaged in order to determine your letter grade. Final Grades will be rounded off from the 2nd decimal place to the 1st decimal place. For example, 93.95 is rounded up to 94.0 (A); 93.94 is rounded down to 93.9 (A-). 90.45 is rounded up to 90.5 (A-); 90.44 is rounded down to 90.4 (B+).

Example	Tables, Graphs, and Data Analysis (CCC requirements)*	Lab Report text	Combined Score	Grading Scale
Lab 1	40/40	55/60		≥94.0 A
Lab 2	35/40	45/60		≥90.5 A-
Lab 3	35/40	50/60		≥87.0 B+
Lab 4	30/40	45/60		≥83.5 B
Lab 5	35/40	55/60		≥80.0 B-
Lab 6	40/40	45/60		≥76.5 C+
Lab 7	35/40	50/60		≥73.0 C
Lab 8	40/40	45/60		≥69.5 C-
				≥66.0 D+
	290/320=90.625%	390/480=81.25%	680/800=85.0%=B	≥62.5 D
				≥59.0 D-
				<59.0 F

*Computer Competency Components: (CCC): You must earn 69.5% or better to get the CCC credit.
The rubric for the CCC for each lab are shown in Appendix 3.

- Data Tables: In your lab reports, tables of the data you collect in each lab module are worth 10-15 points. These tables must include a caption describing what is being presented (4 points). The columns of data must each have a heading (3 points) and must specify the units for each parameter (3 points).
- Data Graphs: Graphs of the data you generate for each lab module are worth 10-15 points each. Each graph must include a caption describing what is being presented (4 points), properly scaled and labeled axes (2 points each), and a legend that indicates which symbols correspond to which set of data (2 points).
- Data Analysis: Calculations that are done with the data are worth 10 points. This includes calculated data in your data tables (for example calculating the population density on Easter Island as a function of time) and other calculations such as the statistical calculations (means, standard deviations, and t-values).

University Attendance Policy: Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "...be honest and truthful and...[to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at http://fda.fsu.edu/academic-resources/academic-integrity-and-grievances/academic-honor-policy.)

Americans With Disabilities Act: Students with disabilities needing academic accommodation should:
(1) register with and provide documentation to the Student Disability Resource Center; and
(2) bring a letter to the instructor indicating the need for accommodation and what type.

Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Student Disability Resource Center has been provided. This syllabus and other class materials are available in alternative format upon request.
Student Disability Resource Center
874 Traditions Way, 108 Student Services Building
Florida State University, Tallahassee, FL 32306-4167
(850) 644-9566 (voice); (850) 644-8504 (TDD); sdrc@admin.fsu.edu; http://www.disabilitycenter.fsu.edu/

Free Tutoring from FSU and Learning Assistance: On-campus tutoring and writing assistance is available for many courses at Florida State University. For more information, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of on-campus tutoring options - see http://ace.fsu.edu/tutoring or contact tutor@fsu.edu. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity. The TA/Mentors will be available by email and by appointment to discuss the course material or just to talk about environmental science. You can email me and the TAs at any time to set up an appointment or with questions about the labs. We are here to help you learn about environmental science. If you are having trouble with the class, please do not wait until the end of the semester to ask for help.

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Appendix: Example Lab report and Grading example
EVR1001L-0001 Spring 2018
Easter Island Lab Report Template with grading scheme
Lab 1: Easter Island: Carrying Capacity and Sustainability Lab Report
Name: _____
Date: _____

Materials and Methods (20 points): You are expected to write every section in your own words (do not just copy what you see here).This section should answer the question: How was the experiment done? In paragraph form, state what you did and what materials you used in order to complete the laboratory. In addition, avoid using the first person (I, we). Instead use phrases like "a line transect was conducted…" or "a time machine was used…". This is called passive voice, and it is traditionally found in many types of scientific writing.

Results: Tables and Graphs (45 points): You are expected to write every section in your own words (do not just copy what you see here). This section will include anything that was measured or calculated in the experiment. A table template has been provided below to get you started. Use Excel or another spreadsheet program to enter your data, to perform calculations on the density of trees and people, and to make charts of the data. As you work on each lab, make sure to write down your results in a lab book as you go along.

Year	**Mulberry Trees** # counted	**Palm Trees** # counted	**People** # counted	**Area of Transect** km^2	**Area of Drone Survey** km^2	**Mulberry Trees** # / km^2	**Palm Trees** # / km^2	**People** # / km^2
900				0.002	162			
1200								
1400								
1500								
1600								
1800								

Data calculations (10 points). The highlighted data columns require you to perform calculations using the data in the data columns.
Area of Tree Transect:

- 200m x 10m = 2,000 m^2
- 2,000 m^2 x (1 km/1000m)^2 = 0.002 km^2

If you counted 20 trees in your transect covering 0.002 km^2, then the overall tree density would be 20 trees divided by 0.002 km^2 = 10,000 trees per km^2.
Drone Survey: If you counted a total of 5000 people on the island (with an area of 162 km^2), then the population density would be 5000 people divided by 162 km^2 = 31 people per km^2.

Also include separate graphs (15 points each) showing trees and population density (y-axes – dependent variables) over time (x-axis – independent variable). Remember to label your x and y axes as well as include a figure legend. Points can will be lost for failure to make the appropriate (assigned) graphs. Points (2 for each axis) can be lost for failure to label the axes or for failure to include a legend (2 points).

Discussion and Conclusions (35 points): You are expected to write every section in your own words (do not copy what you see here). This section should constitute the bulk of the report. Use this section to write a coherent essay about your major findings. You should tell a chronological story of what happened over the different time periods. Refer explicitly to your results (ex. In year 900, the tree population was high (A and B km^{-2}) and the human population was low (X people per km^2)). Think back to your pre-laboratory reading material and try to address the carrying capacity of the island and what possibly happened to the islanders.

2. Easter Island Graded Lab Report Example (with Comments)

Lab 1: Easter Island: Carrying Capacity and Sustainability Lab Report

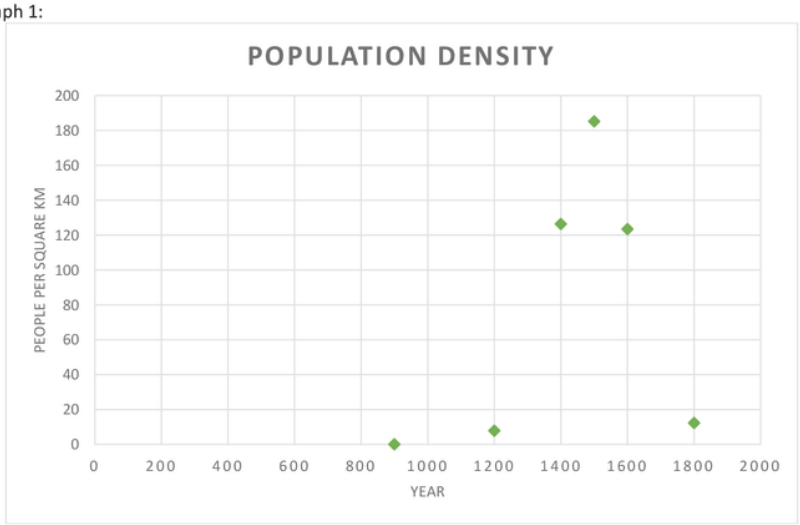
1

Materials and Methods: In order to conduct measurements from Easter Island in the years 900, 1200, 1400, 1500, 1600, and 1800 AD, it was necessary to use a time machine to transport to each different time period. Once transported to the respective time period, a line transect was conducted over 200 meters by 10 meters where Mulberry and Palm Trees were counted. This process was repeated for each of the six time periods. In order to count the population, a drone was used which flew over the civilizations on Easter Island in order to not disturb the population. Here, the population was totaled as well as the area in square kilometers. After the populations and trees were totaled, the raw data was entered in the terminal.

Results: Tables and Graphs:

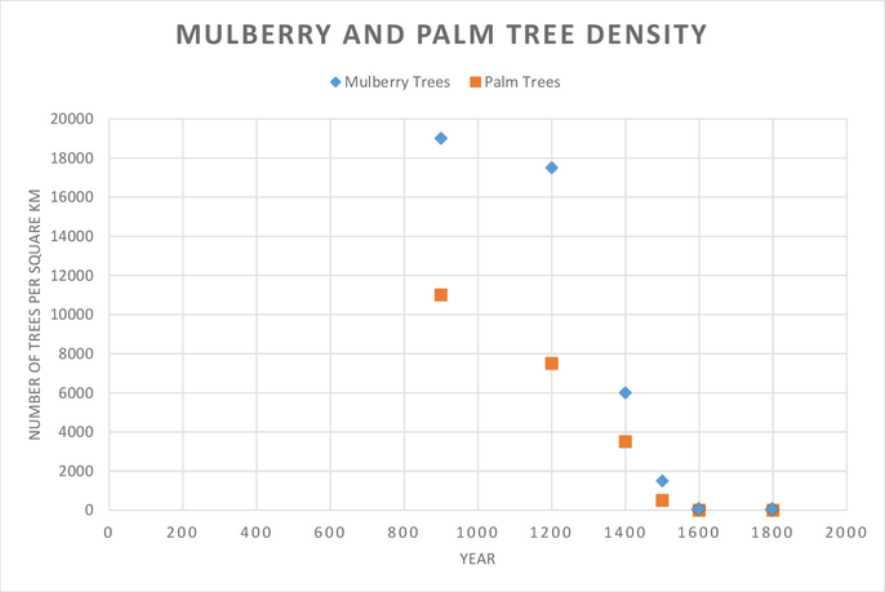
Year	Mulberry Trees (# counted)	Palm Trees (# counted)	People (# counted)	Area of Transect (km^2)	Area of Drone Survey (km^2)	Mulberry Trees ($\#/km^2$)	Palm Trees ($\#/km^2$)	People ($\#/km^2$)
900	38	22	20	0.002	162	19000	11000	0.12
1200	35	15	1280	0.002	162	17500	7500	7.90
1400	12	7	20480	0.002	162	6000	3500	126.42
1500	3	1	30000	0.002	162	1500	500	185.19
1600	0	0	20000	0.002	162	0	0	123.46
1800	0	0	2000	0.002	162	0	0	12.35

Graph 1:



2

Graph 2:



Discussion and Conclusion:

3

Easter Island, a once lush landscape abundant with diverse forest plants, experienced deforestation, lowered yields of crops, and an overall decline in resources due to the humans who inhabited the islands living outside of their means. In the year 900 AD, when Easter Island was first civilized, 20 people lived on the island with a copious amount of mulberry and palm trees per square kilometer. Mulberry trees on the island totaled 19000 per square kilometer and palm trees totaled 11000 per square kilometer. A visible abundance of trees and forestry existed at this time. Three hundred years later, 1200 AD, the population grew by 6300% to a total human population of 1280. Mulberry trees per square kilometer totaled 17500 and palm trees per square kilometer totaled 7500. There was a decrease in tree population and an increase in human population. The decrease in tree population was noticeable, but it was subtle. In the year 1400 AD, the population on Easter Island totaled 20480 people. This is approximately a 1508% increase from the population on the island in 1200 AD. Mulberry trees on the island totaled 6000 per square kilometer and palm trees totaled 3500 per square kilometer. When transecting through the forest, the decrease of mulberry and palm trees was very noticeable. According to the Pearson Pre-Reading materials, between 1400 and 1600 AD, the pollen levels on Easter Island decreased greatly and the charcoal found in the soil meant that the forest had been burned, thus corresponding with the visible decrease in trees. From the reading and video, the forest may have been cut down due to slash-and-burn farming which was necessary to move the gigantic statues up to 6 miles away from the quarry. Human population and tree population seem to be inversely related where an increase in human population leads to a decrease in tree population. One hundred years later, 1500 AD, there were 30000 people living on the island with a mulberry tree population of 1500 and a palm tree population of 500 per square kilometer. Again, the inverse

relationship between human population and tree population can be seen. The year 1600 AD proved to be a turning point for Easter Island. A human population of 20000 existed, a decrease of 33% from 1500 AD. However, the inverse relationship of population and trees was not seen here. It could be inferred that a decrease in population would lead to an increase in trees, however in 1600 AD, the mulberry and palm tree population totaled 0 trees per square kilometer. This suggests that the island reached its carrying capacity and through deforestation, the human population reached its peak and was now in decline due to the lack of natural resources available on the island. By the year 1800 AD, the human population dramatically decreased by 90% from 1600 AD with a total of 2000 people living on the island. The tree population, both mulberry and palm trees, again totaled 0.

By looking at the raw data, one can see a relationship between the number of trees per square kilometer and people per square kilometer regarding the carrying capacity of the island. As the amount of people per square kilometer increased, the amount of trees per square kilometer decreased. However in year 1500 AD, the human population per square kilometer reached its peak at 185.19 people per square km, thus reaching its carrying capacity. By the next century, the human population per square kilometer began to decrease and the mulberry and palm tree population ceased to exist. Even when the population significantly decreased to 2000 in 1800 AD, the mulberry and palm trees did not replenish signifying that the island had reached its carrying capacity and could no longer sustain itself. As the tree population decreased, so did the pollen and amount of crops. This then led to a decrease in animal population and eventually led to the islanders dying off due to a lack of natural resources. It is important to live sustainably in one's environment by not exceeded its carrying capacity to not deplete the environment of its natural resources.

Lab Report 1

GRADEMARK REPORT

FINAL GRADE

95/100

GENERAL COMMENTS

Instructor

PAGE 1

Comment 1

Start with a sentence on the motivation i.e. why you are doing this experiment. Mention the area of drone coverage.

(-5)

Comment 2

Suggestion: You can make the graphs more compact by not starting the x-axis markings at zero. You can also join the points with a line.

PAGE 2

Comment 3

Great job on the conclusion part !

PAGE 3

3. Computer Competency Criteria for each lab module.

Lab 1: Easter Island (40 points)
Data Table: Tree and population survey data. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 10 points total. Calculate the density of each type of tree and the density of people for each time period.
Graph 1: 10 points total. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: 10 points total. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 2: Ice Cores and Climate Change (40 points)
Data Table: 10 points. Ice core CO2 data from the last 1010 years. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 10 points total. Merge ice core data from the last 1010 years with the data provided from the last 420,000 years. Use this web site to zoom into your city or town, and even to your own street, to see the effects of a 6- foot rise in sea level, then discuss what will happen to your hometown. Are there any other harmful effects for Florida from sea level rise? https://coast.noaa.gov/slr/
Graph 1: 10 points total. CO2 concentrations from the ice core for the last 1010 years. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: 10 points total. Ice core CO2 concentrations over time back to 420,000 years before present. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 3: Ocean Acidification (40 points)
Data Table: Coral mesocosm data including temperature, pH, CO2 levels, and coral health indicators. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points). Follow the lab report template to enter your data into the tables as described.
Graph 1: 10 points total. pH levels in response to pCO2. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: 10 points total. % Bleaching of Acropora and Porites as a function of pCO2 at two different temperatures. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 3: 10 points total. % bleaching in response to pH balance. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 4: Invasive Species (40 points)
Data Table: Predator and forage fish data from the transect surveys. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 10 points total. Calculate the density of each fish species and the coverage of algae vs. coral for each time period and include those results in the data table.
Graph 1: 10 points total. Density of lionfish and prey fish as a function of time across the survey period. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: 10 points total. Coverage of algae and coral as a function of time across the survey period. Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 5: Frogs and Atrazine (40 points)
Data Table: Frog sex and testosterone levels for each treatment. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 30 points total. Follow the example given in the pre-lab instructions, and explain how you calculated the correct amount of atrazine to add to each Treatment aquarium. Calculate the means and standard deviations of the testosterone levels for the Control group and the Treatment group in Excel using the

entire class data set (10 points each). Calculate the "t-test" value (using the equation given) to determine whether or not the testosterone levels are significantly different between the Control and the Treatment groups (10 points). Report and discuss these calculated results.
Graph 1: No graphs required for this lab
Graph 2: No graphs required for this lab.

Lab 6: Nutrient use on a farm (40 points).
Data Table: Phosphorus added and sugar cane yield data. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 10 points total. Calculate the cost per hectare for the phosphorus fertilizer used for each treatment and include these results in the data table.
Graph 1: Sugarcane yield (per hectare) vs. P applied (per hectare). Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: Sugarcane yield (per hectare) vs. Cost for P applied (per hectare). Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 7: Nutrient runoff and watershed impacts (40 points).
Data Table: Data from 6 test watersheds (Phosphorus added, oxygen, nutrient, and chlorophyll concentrations). 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: none required for this lab.
Graph 1: 10 points. Dissolved oxygen (dependent variable) versus "P added" (independent variable). Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 2: 10 points. Dissolved inorganic nitrogen and phosphorus (dependent variables) versus "P added" (independent variable). Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).
Graph 3: 10 points. Chlorophyll-a (dependent variable) versus "P added" (independent variable). Figure caption (4 points). Properly scaled and labeled axes (2 points each). Legend (2 points).

Lab 8: Green building (40 points).
Data Table: Data for modifications made to each room to improve energy efficiency. 10 points total. Table caption (4 points). Column headings (3 points). Units (3 points).
Data analysis: 30 points. In your discussion, compare quantitatively (in dollars saved) how each modification for each room improves (or not) the energy efficiency of the entire house. For example, changing the windows in the lobby/foyer from double glazed to triple glazed resulted in better heat retention; less energy used for home heating ($25 savings).
Graph 1: Not required for this lab.
Graph 2: Not required for this lab.