

NR 4 – Forest Ecosystems

Section # 50165

Units: 3

Course Syllabus – Spring 2023

Lecture Monday 2:00pm – 3:50pm in FNR 8

Lab Wednesday 2:00pm – 4:50pm in FNR 8

Instructor: Louie Long

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Office Hours: T 10:00-11:50am, Th 10:00-11:50am, Other Times By Appointment

Course Description: The forest community is used as a model to discuss the role of ecology in forest management. Students will become familiar with basic biological concepts which are the building blocks for understanding forest ecosystems. Students will gain a better understanding of biological processes and organization, the physical environment, and ecological processes such as: nutrient cycling, succession, natural selection, and application of the scientific method.

Course Objectives: In the process of completing this course you will:

1. Gain an understanding of cellular processes, biological and environmental factors, and how they relate to forest growth and development.
2. Analyze forest communities by collecting data and applying the scientific method.
3. Define populations and communities and understand the dynamics and factors that influence each, including succession and its impact on community structure and function.
4. Understand the response of ecosystems to natural and human-induced disturbances.
5. Recognize ecosystem components and be able to describe their structure and functions.

Student Learning Outcomes: Upon completing this course students will:

SLO1: Demonstrate an understanding of factors that affect forest growth and development such as the water cycle and the nutrient cycle.

SLO2: Understand the basics of how energy flows through a forest ecosystem.

SLO3: Understand the components of a forest ecosystem and how they work together.

Required Materials: The following is a list of required materials needed to successfully complete this course including textbooks and lab manuals.

Textbook(s): All lecture material (Power Points, handouts) will be made available to you via CANVAS in advance of the lecture and will remain available for the duration of the class. Studying the lecture material is important for your success in this class. *The text book listed below is optional.* Not all of the material we cover in this class is found in the text listed.

Krogh, D. 2014. Biology: A guide to the natural world, custom core edition. Pearson Prentice Hall. Upper Saddle River, New Jersey. Loose leaf (Optional)

Modules: You will find modules that you must complete on the Canvas page for this course. There may be quizzes embedded in the modules to help test your level of understanding. Modules are sequential and mandatory. Failure to complete the modules will result in a sub-par grade.

Lab manual (Required)

We will complete a lab assignment each week unless otherwise instructed. The instructions for each lab as well as the data sheets and materials that you will submit for a grade are found in the lab manual. The NR 4 Lab Manual will be provided to you. It is your responsibility to bring it to each lab class. I will not make copies of the day's lab if you forget to bring your lab manual.

Assignments:

Assignments for the lecture portion of the class will consist of completing the readings from the modules and completing the associated quizzes. In addition, you will be expected to review the lab for the week. This means you will review/read the lab sheets and come prepared to ask any questions you may have. You will also be expected to have your lab manual with you during the lab portion of the class. I will not accept lab assignments turned in on lined paper. All lab assignments are due at the end of the lab period unless otherwise instructed. Simply write your name on the front page, staple all of the pages together and leave it on the podium in the front of the class. Because many of the labs that we complete require the use of special equipment or additional setup time, it is difficult to make up a lab assignment. If you need to make up a lab, it is your responsibility to arrange a make-up time. There is no guarantee that you will be able to make up the lab however.

Grading Philosophy:

The purpose of this course is to teach students the basic biology of the forest ecosystem as well as field protocols that are commonly utilized in the forestry and natural resources field. Historically a student's understanding of the subject and mastery of skills has been based on traditional multiple-choice exams and quizzes, and labs that are assigned a point value. Students acquire points over the course of the semester and earn a grade based on a 100% scale. While easy to use, this type of grading system does not accurately assess a student's understanding of the subject matter. I am not interested in how well you can take a test. I am, however, interested in how well you understand the material that we will be covering over the course of the semester.

In an effort to accurately assess your mastery of the subject matter and field protocols, we will be using a Skill Mastery Scale to determine your level of understanding. The Student Learning Outcomes (SLO) and skills that we will be learning and assessing are listed below;

SLO1: Demonstrate an understanding of factors that affect forest growth and development such as the water cycle and the nutrient cycle.

Skill 1.1: Understand basic chemistry principles

Skill 1.2: Understand cellular structures (organelles) and processes (protein synthesis)

Skill 1.3: Understand cellular division

- Skill 1.4: Understand plant growth cycles
- Skill 1.5: Understand photosynthesis
- Skill 1.6: Understand cellular respiration
- Skill 1.7: Understand nutrient requirements (Nutrient cycle)
- Skill 1.8: Understand the Hydrologic Cycle
- Skill 1.9: Understand germination processes
- Skill 1.10: Understand Recruitment and Establishment of forest plants/trees

SLO2: Understand the basics of how energy flows through a forest ecosystem.

- Skill 2.1: Understand what energy is
- Skill 2.2: Understand how photosynthesis provides energy for plants.
- Skill 2.3: Understand how Cellular Respiration provides energy for plants.
- Skill 2.4: Understand exchange of energy in the form of heat.
- Skill 2.5: Understand albedo and reflectivity and their effects on energy exchange.

SLO3: Understand the components of a forest ecosystem and how they work together.

- Skill 3.1: Understand soils
- Skill 3.2: Understand forest succession
- Skill 3.3: Understand the effects of topography on plant growth.
- Skill 3.4: Understand the role of fire
- Skill 3.5: Understand how to set up a quadrat for sampling vegetation
- Skill 3.6: Understand how to reduce bias in sampling events
- Skill 3.7: Working as part of a crew/team
- Skill 3.8: Critical thinking to solve a problem in the lab or in the field

Each lab assignment will reinforce a topic we've discussed in class and help students master one or more of the skills listed above. Each assignment will be graded using a Skill Mastery Scale that ranges from 0 – 4 where a 0 means that the student has not demonstrated any comprehension of the skill and a 4 means that the student has mastered the skill (see Table 1 below). As with anything, **practice makes improvement**. Your job is to learn the skill and demonstrate mastery. If you fail to demonstrate mastery of a skill during any of the individual labs there will be opportunities to re-do the lab or portions of the lab to get more experience and practice with the skill in order to demonstrate mastery.

We will take 2 midterms and a final exam this semester. Exams will be graded using the same Skill Mastery Scale that is used to grade lab assignments. Once again, practice makes improvement. While the exam is a test of your level of understanding, it is also an opportunity to improve your level of understanding. As such, you will be given the opportunity to re-do any exam questions that you do not answer satisfactorily. The only exception would be the final exam. Since the final exam is given during the last week of the semester, there won't be any time available to re-do any missed questions.

Table 1: Skill Mastery Scale used for grading in this course.

Score	Mastery Scale			
4	Exceptional Competence	A	3.50 – 4.00	87.50% – 100%
3	Clear Competence	B	2.75 – 3.49	68.75% – 87.40%
2	Adequate Competence	C	2.00 – 2.74	50.00% – 68.74%
1	Basic Competence	D	1.25 – 1.99	31.25% – 49.90%
0	No Evidence of Progress Towards the Learning Target	F	0 – 1.24	<31.25%

Important Note: One of the intangible skills that you should be learning during your time in the Forestry & Natural Resources Program is initiative. **Initiative: noun 1. the ability to assess and initiate things independently.** It will be your responsibility to schedule re-do work. I will make time available for the re-do work but you must schedule in a timely manner the time to complete the re-do work.

Quizzes:

You will complete multiple quizzes throughout the semester. Most of them will be embedded in the Modules that you are expected to complete thus they will be completed online as homework. You may also be asked to complete additional quizzes during the class period should I feel that they are necessary. All quizzes will be graded using the same Skill Mastery Scale as all other assignments.

Exams:

We will take 2 midterm exams and a final exam in this class. The 1st midterm will cover all material discussed from day 1 until the exam date. The 2nd midterm will cover all material discussed after the 1st midterm until the exam date. The final exam will be a cumulative exam that covers all material discussed starting from day 1.

All exams will be essay type answers. You will be asked to explain in your own words everything you know about the topic of the questions. Example: *In your own words describe the two types of germination that we discussed in class. What is the primary difference between the two?* If you miss an exam, it is your responsibility to schedule a make-up exam.

You can keep track of your grades by logging onto CANVAS from the Reedley College Homepage. I encourage you to check CANVAS daily for announcements as well as to keep track of your grade.

Essential Information:

You are expected to treat others as you would want to be treated yourself, even if you disagree with an expressed opinion. Please refrain from using foul language. As a student in the Forestry Program, you are preparing yourself for a professional career in the natural resource field and you are expected to conduct yourself as such at all times.

Be on time! Walking into class late is distracting. Make sure you give yourself plenty of time to make it to school, find a parking spot, and walk to class. It is your responsibility to stay informed on any changes to assignment due dates, readings, test material, etc.

Missing a class doesn't excuse you from this responsibility (i.e. if a due date for an assignment changes, new assignments are given, etc.). This means you should ask a trustworthy classmate for notes if you are absent. Being absent is not an excuse for late work, late assignments, or just not knowing what is happening. Check CANVAS often!!! I recommend checking CANVAS every day and not just for this class.

If for whatever reason you cannot complete the class this semester, make sure that you officially drop the class via Self-Service. If you just stop showing up for class, you may not be officially dropped and end up receiving an "F" in the class when you thought you had withdrawn.

Important Dates:

Monday, January 16 ----- Martin Luther King Jr Day – No Class
Friday, January 20 ----- Last day to drop a spring full-term class for full refund
Friday, January 27 ----- Last day to register for a full-term class in person
Friday, January 27 ----- Last day to drop a spring class to avoid a "W" in person
Sunday, January 29 ----- Last day to drop a spring class to avoid a "W" on Self-Service
Friday, February 10----- Last day to change class to/from Pass/No-Pass grading basis
Friday, February 17----- Lincoln Day - No Class
Monday, February 20 ----- Washington Day - No Class
Friday, March 10----- Last day to drop a full-term class. Letter grade assigned after this date
Monday – Friday, April 3 – 7----- Spring Break
Monday – Friday, May 15 - 19----- Finals Week

It is important for you to show up for class. While the lecture material is available on CANVAS, we will be discussing the material in depth during class. This is something that the power point slides alone cannot duplicate. As per college policy, I have to drop you if you miss 3 or more classes.

Please turn cell phones off during class time. Using these devices during lectures is distracting to you and to students around you as well as to me. Trying to hide your phone under the table doesn't work either. I still see you using it. Don't make me call you out in class.

Cheating and/or plagiarism will not be tolerated. You will not receive credit for an assignment if, in my opinion, you have cheated. Cheating on an exam will result in an "F" on the exam and could result in dismissal from the Forestry Program. While cheating is not tolerated, I encourage you to work together on lab assignments. This makes the lab more interesting and helps you to learn the material. Even though you are working in groups, you will each be required to submit your own lab sheet unless otherwise instructed.

All tobacco products are NOT permitted in the classroom or laboratory setting. Reedley College is now a smoke free campus.

"If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible."

Topics of Discussion

1. The Basics of Life – We will discuss the chemistry of life starting with the atom and its subatomic particles. You will learn about chemical bonds and the roles that they play not only in life but in the forest. You will also learn the basics of the cell. We will discuss structural differences between plant and animal cells. In nature, nothing happens in a vacuum. Everything relates to something else. In this section we will lay the groundwork for a better understanding of how the forest functions.
2. Energy in the Forest – All living things consume energy. It is one of the characteristics of life. In this section we will learn about energy in the forest. What is it? How is it produced? How is it used? You will learn the basics of photosynthesis, where it occurs, and how it produces energy. We will also be introduced to Cellular Respiration.
3. Structure & Growth – A forest is a dynamic ecosystem. Life and death are a constant factor in the forest ecosystem. In this section we will discuss how plant life begins in the forest. We will cover the basics of germination, growth, and form.
4. Site Factors: Climate – Many factors play in role in the health of a forest. In this section we will begin the discussion about the four site factors that affect forest productivity by focusing on climate. We will discuss solar radiation and its impact on photosynthesis and well as tree morphology.
5. Site Factors: Forest Soils – Dirt is what you find under your finger nails, soil is what plants grow in. In this section we will learn the basics of how soil is formed. We will also learn about soil texture and structure and its impact of tree growth.
6. Site Factors: Biological Factors a.k.a. The Nutrient Cycle – Soil is what plants grow in but without nutrients, there wouldn't be much growth. In this section we'll discuss the nutrients found in forest soils. Are forest soils nutrient rich or nutrient poor? Where do the nutrients come from? How do the nutrients enter the plant? Once nutrients are taken up by a plant, are they lost forever? We'll answer all of these questions and a few more in this section.
7. Site Factors: Fire – For more than a century we've been told that fire was bad for our forests. Is this really true? Is it possible that fire is good for a forest? If so, how? In this section we'll discuss the role that fire plays in the forest ecosystem.
8. The Soil-Plant Water Cycle – You probably know or have at least heard of the hydrologic cycle. In this section we will take a more in depth look at the hydrologic cycle. You'll gain a basic understanding of how energy relates to water and how water moves through the forest. We'll discuss transpiration, evaporation, and evapotranspiration. We'll also learn about something called gravitational water, capillary water, and hygroscopic water.

Tentative Schedule: (Subject to Change)

Week	Date	Lecture Topic/Modules	Date	Lab Topic
1	1/9/2023	Intro., Why we study Ecology	1/11/2023	Calculations
2	1/16/2023	MLK Day - No Class	1/18/2023	Field Observations
3	1/23/2023	The Basics of Life	1/25/2023	Scientific Writing
4	1/30/2023	Energy in the forest	2/1/2023	Microscopy
5	2/6/2023	Energy in the forest, Review for Midterm	2/8/2023	Taxonomic Keys
6	2/13/2023	Midterm #1	2/15/2023	Quadrat Practice
7	2/20/2023	Washington Day - No Class	2/22/2023	Pattern Analysis
8	2/27/2023	Structure & Growth	3/1/2023	Community Structure
9	3/6/2023	Site Factors: Climate	3/8/2023	Primary Productivity
10	3/13/2023	Site Factors: Climate	3/15/2023	Primary Productivity
11	3/20/2023	Site Factors: Forest Soils	3/22/2023	Infiltration
12	3/27/2023	Midterm #2	3/29/2023	Make-up day
	4/3/2023	Spring Break - No Class	4/5/2023	Spring Break - No Class
13	4/10/2023	Site Factors: Nutrient Cycle	4/12/2023	Run-off & Soil Erosion
14	4/17/2023	Soil Factors: Plant Water Cycle	4/19/2023	Soil Characteristics & Plant Growth Part 1
15	4/24/2023	Soil Factors: Fire	4/26/2023	Transpiration
16	5/1/2023	TBD	5/3/2023	Soil Characteristics & Plant Growth Part 2
17	5/8/2023	Review for Final Exam	5/10/2023	Open Lab
18	5/15/2023	No Lecture	5/17/2023	Final Exam @ 2pm-3:50pm