

KBCC Biological Sciences Spring 2018
Lecture 01 (17133) Mondays 1:50 – 5:10 S246
Lab 01L (17144) Wednesdays 1:50 – 5:10 S226

Professor: Christina Colón Ph.D.
christina.colon@kbcc.cuny.edu
Office S-134 (718) 368-6801

Biology 5300: Ecology

This 4 credit 6 hour laboratory course is an elective for biology majors interested in studying local and global ecosystems. Ecology is the study of interactions between organisms and their environment. It entails study of the structure, function and interactions of populations, communities and ecosystems as well as energy flow and biogeochemical cycling in nature. Human impacts on and remediation of these systems will also be examined.

LECTURE: PowerPoint based, with discussions, videos, group activities, field trips and student presentations. Students are required to actively participate in class discussions and to stay abreast of current issues in ecology.

Civic Engagement: This involves citizen science research. This requires a commitment of 6 hours of volunteer time outside of class. This research is part of two ongoing investigations. One is on the Atlantic horseshoe crabs (*Limulus polyphemus*) and the other is on the Eastern Coyote (*Canis latrans x lycaon*).

ATTENDANCE: Attendance will be taken at the start of class. Any student not present at that time will be marked **absent**. Any student arriving after attendance has been taken will be marked **late**. Attendance and participation count towards your grade. Students must be on task, taking notes and *attentive* to be given credit.

ETIQUETTE: Please maintain a respectful and collaborative learning environment. All cell phones must be muted during class. Plagiarism (e.g. copying text as though it is your own EVEN when cited) and/or cheating will not be tolerated. Use of any electronic devices for ANY reason during tests is considered cheating.

TIPS FOR SUCCESS: Come to class prepared and ready to learn (not to sleep, text, eat etc.) Be on time. Complete all assignments on time and to the best of your ability. Be visible and active in class. Read chapters *before* class. Be ready to discuss. Ask questions that show you are engaged with the content. Learning is not passive.

EXTRA CREDIT: One point of extra credit up to a maximum of 5 points (5% of the final grade) will be given for each talk, film screening, training, or other event attended in conjunction with Eco-Festival, 2018. These will take place May 9th, 10th in the Lighthouse (MAC) and Friday May 11th on KBCC campus.

TEXT: *Elements of Ecology* 9th Edition (or 8th, or 7th) by T. Smith and R. Smith, Pearson Benjamin Cummings
THERE WILL BE NO LAB MANUAL. ALL LABS ARE STUDENT DRIVEN AND INQUIRY BASED

GRADE BREAKDOWN:

Active participation	10%
Group inquiry investigations	10%
Term paper	10%
PowerPoint presentation	10%
Lab assignments	10%
Unit tests (3)	10% each 30%
Cumulative final exam	20%
TOTAL:	100%

TOPICS COVERED AND ASSIGNMENTS EACH WEEK

- March 5 **Lecture 1:** Chapter 1- Introduction to Ecology
March 7 **Lab 1:** Quantifying fish **behavior** in Jim Goetz Aquarium
PAPER OUTLINE DUE (species, scientific name, ecological and conservation issues)
- March 12 **Lecture 2:** Chapter 9 - Populations
1st SCIENTIFIC PEER REVIEWED ARTICLE DUE on **behavior** of your species
Print abstract, hi-light key findings, write summary at top. Circle lead author, year and journal
- March 14 **Lab 2:** **Quantifying** animals populations through **camera trapping** data
- March 19 **Lecture 3:** Chapters 11+13- Competition
2nd SCIENTIFIC PEER REVIEWED ARTICLE DUE on **competition** in your species
- March 21 **Lab 3:** **Inquiry** investigation of **competition** among birds on campus. Generate hypothesis, research proposal methods. Once approved, collect data and draw conclusions.
- March 26 **Lecture 4:** Chapter 14 - Predation
3rd SCIENTIFIC PEER REVIEWED ARTICLE DUE on **trophic role** of your species
- March 28 **Lab 4:** **Inquiry** investigation into bird **predation** on campus.

SPRING BREAK NO CLASS March 30 April 2

- April 9 **Lecture 5:** Chapter 15- Parasitism and Mutualism **UNIT 1 EXAM: Ch. 1, 9, 11, 13, 14**
April 11 **Lab 5:** **Symbiosis** Marine invertebrate **epibiont investigation**
- April 16 **Lecture 6:** Chapter 16 – Communities **TERM PAPER DUE**
April 18 **Lab 6:** Outdoor exploration of phenology among campus trees.
- April 23 **Lecture 7:** Chapter 28 - Conservation
April 25 **Lab 7:** Limulus Lifeline overfishing simulation
- April 30 **Lecture 8:** Chapter 24 - Terrestrial Ecosystems **UNIT 2 EXAM Ch. 15, 16, 28**
May 2 **Lab 8:** **FIELD TRIP #1 TO PLUMB BEACH** (Low Tide 4:53pm)
- May 7 **Lecture 9:** Chapter 23 - Aquatic Ecosystems
May 9 **Lab 9:** **Eco-Festival** – Wildlife Conservation film festival and panel in MAC Lighthouse
EXTRA CREDIT May 10th and 11th Eco-Festival events start in M 130C/KBCC Aquarium
- May 14 **Lecture 10:** Chapter 26 – Patterns of Biodiversity
May 16 **Lab 10:** **FIELD TRIP #2 TO PLUMB BEACH** (Low Tide 3:53pm)
Bring sunblock, rubber boots, water, a snack and a hat. You will get muddy up to your knees.
- May 21 **MEMORIAL DAY NO CLASS**
May 23 **Lab 11:** Sifting sand and counting horseshoe crab eggs
- May 28 **Lecture 11:** **UNIT 3 EXAM Ch 26, 23, 24**
May 30 **Lab 12:** **FIELD TRIP #3 TO PLUMB BEACH** (Low tide: 3:50pm)
Bring sunblock, rubber boots, water, a snack and a hat. You will get muddy up to your knees.
- June 4 **Lecture 12:** STUDENT PowerPoint PRESENTATIONS

INDEPENDENT INQUIRY INVESTIGATION This group assignment will entail an investigation of a population of plants, fungi or animals on or around campus. Students will work in teams to generate a scientific research question. They will design and carry out a short investigation, collect data, draw conclusions, graph, write up and present their findings.. This investigation will count for 10% of final grades and will be based on group effort as well as individual typed reports. Report will contain the following headings

1. Title of investigation, species and name of students
2. Background
3. Research question and hypothesis
4. Methods
5. Results
6. Conclusions

TERM PAPER This 5 page, research report must be on an important **LOCAL SPECIES**.

The topic and title must be approved by the professor. The report must be comprised exclusively of peer reviewed sources. You must summarize two peer reviewed article for the first 6 of the following sections:

1. Morphology
2. Habitat
3. Range
4. Taxonomy
5. Ecological Role
6. Trophic Role
7. Impacts on and by Humans (you may use a **popular** article for this section)
8. Legal/IUCN Conservation status (go to **IUCN website** for this information)
9. Methods of research showing one way this organism is studied
10. Literature Cited All articles/sources referenced must be alphabetically listed at the end as follows:
Author last name, First initial (year) Title of article. *Name of Journal*. Issue/Volume: Page #s.

This report will count for 10% of your final grade, and must be neatly typed, on 8.5 x 11 white paper, 12 point font, 1.5 spacing, double sided. No cover page. Literature sources and summaries must be referenced in the paper by 1st and 2nd and 3rd author's last name (1st author followed by et al. if there are more than three). This report must include 6 valid scientific sources along with a Xeroxed copy of the abstract/1st page of each article.

ORAL POWERPOINT PRESENTATION A 7 minute, 6 slide PowerPoint presentation based on the written report will be made by each student on the final day. This assignment will count as 10% of final grades and must be submitted as an email attachment as well as on a flash drive. PowerPoint presentations must use 24 point font, high contrast, clear images and bulleted talking points. Each slide must have a relevant title

1. A title page with the title of the presentation, correct species name, and name of the presenter
2. A slide showing the historic and present range of the species and its conservation status
3. A slide showing the taxonomic classification of the species and closely related species
4. A slide summarizing the natural history of the species (trophic role, habitat, niche, etc.)
5. A slide summarizing the most important issue facing this species
6. A slide summarizing one scientific study done on the species, showing methods and results

MEASURABLE LEARNING OUTCOMES

1. Apply methods and processes of life science by designing and conducting ecological investigations.
2. Demonstrate proficiency in quantitative reasoning by analyzing, depicting and interpreting original data.
3. Compare and contrast adaptations associated with organisms found in distinct biomes.

4. Demonstrate an understanding of the pathways of energy transfer and matter cycling within living systems by constructing trophic pyramids, food webs and carbon cycles.
5. Demonstrate an understanding of the levels of biological organization and interactions by listing different types of ecological interactions between individuals in a population, a community, and an ecosystem.

LEARNING COMPETENCIES

Become civically engaged
 Develop observation skills
 Develop library research skills
 Understand the scientific method
 Develop public speaking skills
 Develop scientific writing skills
 Become proficient in PowerPoint
 Become proficient in MS Word
 Become proficient in MS Excel
 Develop classification skills
 Develop identification skills
 Know ecological hierarchy
 Understand trophic pyramids
 Use descriptive statistics
 Conduct mathematical calculations
 Understand human impacts
 Differentiate between ecosystems
 Describe local and global biomes
 Understand animal behavior
 Conduct biodiversity censuses
 Conduct chemical analyses

ACTIONS TO MEET THESE COMPETENCIES

Volunteer with New York City Audubon to study horseshoe crabs
 Observe, diagram and describe organism in natural ecosystems
 Find appropriate peer reviewed scientific articles on a local species
 Conduct an independent research investigation on a local species
 Present research findings to a group of peers
 Summarize findings of investigation in a research paper
 Prepare and deliver a presentation to the class using PowerPoint
 Create a written term paper using Microsoft Word
 Create data sheets, data tables and graphs using Microsoft Excel
 Classify local organisms to the correct taxa
 Use a dichotomous key to ID local species of plants and animals
 Identify the correct ecological hierarchy of groups of organisms
 List the correct trophic role and level of local organisms
 Statistically summarize differences between populations
 Describe populations mathematically using a diversity index
 Conduct research paper on a local environmental issue
 Compare physical and biological differences between ecosystems
 Compare local biomes to those seen in exhibits and museums
 Construct an ethogram to observe behavior of local species
 Survey local organisms for diversity and density
 Sample water for pH, nitrate, phosphate, salinity, and temperature

CIVIC ENGAGEMENT COMPETENCIES

Civic Knowledge	Students examine and discuss the role of government in managing shared public space in a way that balances needs of all constituencies.
Advocacy	Students debate the merits and liabilities of protecting local ecosystems and the species they support.
Social Responsibility	Students simulate sustainable harvest of declining species and discuss the challenges of meeting but not exceeding one's needs.
Service	Students participate in volunteer based citizen science research project with New York City Audubon as a community partner.