

KBCC Biological Sciences
Lecture: PowerPoint lectures + Weekly discussions
Lab: Student driven Inquiry Labs and research reports

Professor: Christina Colón Ph.D.
christina.colon@kbcc.cuny.edu
Office hours T/Th 12pm & by apptmnt

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, virtual field trips and student presentations. Students are required to actively participate in discussions and to stay abreast of current literature.

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

TIPS FOR SUCCESS: Approach each lesson prepared to learn (not to sleep, text, eat etc.) Complete all assignments on time and to the best of your ability. Be visible and active in class/Blackboard. Read assignments *before* attempting labs or discussion posts. Try to 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 virtual lecture event attended during the course of the semester.

TEXT: Townsend *Essentials of Ecology* (free PDF <https://epdf.tips/queue/essentials-of-ecology.html>)

THERE IS NO LAB MANUAL. ALL LABS ARE STUDENT DRIVEN AND INQUIRY BASED

GRADE BREAKDOWN:

Lab reports	30%
Term paper	10%
Oral Presentation	10%
Unit tests (2)15% each	30%
Cumulative final exam	20%
TOTAL:	100%

TOPICS AND ASSIGNMENTS

WEEK 1	<u>Introduction to Ecology</u> Ch 1
Discussion 1	Introductions and favorite species
Lab 1	Spying on Nature: Camera Trapping Urban Wildlife
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WEEK 2	<u>Populations</u> Ch 5
Discussion 2	A study of population estimates of your species.
Lab 2	Mark Recapture 'Skittlebug' Population Estimation
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WEEK 3	<u>Competition</u> Ch 6
Discussion 3	A study of interspecific competition
Lab 3	Barnacle Competition Virtual Biology Lab Simulation
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WEEK 4	<u>Predation</u> Ch 7
Discussion 4	A study of anti-predator adaptations
Lab 4	Gull Predation at Kingsborough Community College
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WEEK 5	<u>Parasitism & Mutualism</u> Ch 8
Discussion 5	A study of parasites, intermediate, & definitive host
Lab 5	Epibiont Investigation of Horseshoe Crabs
	UNIT 1 TEST
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WEEK 6	<u>Communities</u> Ch 9
Discussion 6	A study of extinction, exclusion or introduction
Lab 6	Simpson's Diversity Index with iNaturalist
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WEEK 7	<u>Terrestrial Ecosystems</u> Ch 4
Discussion 7:	Phenology of habitat of your species. phenology of your species
Lab 7	Tree Phenology
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WEEK 8	<u>Aquatic Ecosystems</u> Ch 4.5
Discussion 8	Microplastics in aquatic species impacted directly and indirectly
Lab 8	Aquarium Ethograms to quantify behaviors among sharks
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WEEK 9	<u>Conservation</u> Ch 14
Discussion 9	Go to www.iucnredlist.org report on your selected species
	Term Paper Due
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WEEK 10	<u>Biodiversity</u> Ch 10
Discussion 10	A scientific description of a newly discovered species
Lab 10	Island Biogeography Simulation
	UNIT 2 TEST
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WEEK 11	Malay Civet Presentation
	Narrated PowerPoint Due
	Student Presentations Watch each, select 1 st , 2 nd 3 rd place
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WEEK 12	Horseshoe Crab Presentation
Discussion 12:	Favorite aspect of the class & most important thing learned

INQUIRY INVESTIGATIONS Lab assignments will entail an investigation of a citizen science research project. Students will work to generate a scientific research question, collect data, answer that question with the data and generate a group report with at least one graph or chart. These investigations will count for 30% of final grades and will be based on contribution to a group citizen science project and individual student work. Each report will contain the following headings.

1. **Title** of investigation, species and name of students
2. **Background** information based on no less than 3 current peer reviewed scientific sources
3. **Research question** stated as a hypothesis
4. **Methods** used in this investigation to collect and analyze data
5. **Results** in written and graphical form showing the key findings
6. **Conclusions** of the study and discussion of how it compares to 3 other similar studies in the literature.

TERM PAPER a 5 page report must be on a species connected to New York City.

The topic and title must be approved by the professor. The report must be supported by 8 peer reviewed scientific sources. Each section below must be clearly indicated by a heading and must contain one half page of text and at least one citation. You must summarize one peer reviewed article for EACH of the following sections:

1. Taxonomy
2. Distribution
3. Habitat
4. Competition
5. Predation
6. Parasites or Mutualists
7. Trophic Role
8. Human impacts

Literature Cited All articles/sources referenced in the report must be alphabetically listed 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 sheets. The literature section must be on a separate page. Pages must be numbered clearly. No cover page. No images or charts. ALL literature sources must be referenced in the paper by 1st and 2nd author's last name (1st author followed by et al. if more than two). This report must include **eight** valid scientific sources along with a Xeroxed copy of the abstract or 1st page of each article. The title of your report must include the common and scientific name and must be descriptive of the organism.

ORAL PRESENTATION A 10 minute, 9 slide PowerPoint presentation based on your term paper will be made by each student during the final week. This will count as 10% of your grade and must be submitted as an email attachment as well as on a flash drive. The file must include the name of the presenter and the course number. PowerPoint/Prezi presentations must use 24 point font, high contrast, clear images and bulleted talking points. Each slide must have the same titles as the sections of your term paper. The presentation must contain a title page with the title of presentation, correct species name, and name of the presenter. Each slide should have a relevant image of the topic (eg a range map, closest kin, habitat, effects by/on humans methods of study, etc).

MEASURABLE LEARNING OUTCOMES

1. Apply methods and processes of life science by designing, conducting and writing up scientific investigations.
2. Demonstrate proficiency in quantitative reasoning by analyzing, depicting, interpreting and comparing data.
3. Compare and contrast evolutionary adaptations of organisms under various environmental and ecological conditions.
4. Demonstrate an understanding of the pathways of energy transfer and matter cycling within living systems by constructing trophic pyramids, food webs and nutrient cycles.
5. Demonstrate an understanding of the levels of biological organization and interactions by describing different types of ecological interactions between individuals in populations, communities, and ecosystems.

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
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

ACTIONS TO MEET THESE COMPETENCIES

Volunteer with IUCN and Gotham Coyote
Observe, measure and describe organism in natural ecosystems
Find appropriate peer reviewed scientific articles on a local species
Conduct independent research investigations on local species
Present research findings to other researchers and your 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
List the correct trophic role and level of local organisms
Statistically summarize differences between populations or data sets
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 observed elsewhere
Construct an ethogram to observe behavior of local species
Survey local organisms for diversity and density