

Research Projects

Students will conduct an independent research project on a topic of choice related to some aspect of natural history/field ecology. Each student will do the following as part of their project:

- Write a brief research proposal (max. 1 page)
- Conduct the actual research and collect original data in the field
- Report the results in a written report
- Report the results in an oral presentation

It is important to get started on your project *early in the semester* before the cold weather arrives and plants senesce, insects become dormant, and animals hibernate, migrate, etc. To encourage this, we have established a series of due dates throughout the semester where your progress will be assessed. Each step will contribute to the overall grade of your research project.

DUE DATES:

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| Sept. 6 | Research proposal due (by lecture) |
| Sept. 8 & 9 | Proposal Discussion (during Thurs/Fri Lab) |
| Sept. 13 | Revised Research Proposal due (if necessary; turn in at lecture) |
| Oct. 27-28 | Research Project Review (data and progress are reviewed at Thurs/Fri Lab; data collection should be complete by this stage!) |
| Nov. 15-18 | Research Presentations Week (during Tues-Fri Labs) |
| Nov. 22 | Research Papers Due @ 11:59 pm |

Research Proposal Guidelines

The most challenging part of a research project is identifying a topic. Unfortunately, there is no simple format for doing so and developing a good research topic is a skill that needs to be developed. The emphasis in this class is on field observations of natural phenomena. As you walk around campus and spend time in field labs, look around you and question what you see. Look at the course syllabus – is there some aspect of class you are interested in learning more about?

Scan research websites and the scientific literature for ideas. Brainstorm an idea with fellow classmates or with instructors and TAs, but please try do your own advance thinking on this (don't rely on us to come up with your project). In other words, start thinking about project ideas now!

Once you have selected a general topic, you will need to focus your topic and formulate research question(s). To do this, you will need some context or background information about your topic. Conduct a literature and web search to refine your topic: Has the topic already been covered comprehensively elsewhere? Is there a new approach/perspective you can explore? Is your topic too broad or narrow? Your research questions will guide your research process.

Once you formulate your research question, you then need to develop a plan for where and how you are going to collect your field data. Where is/are your study sites? What data will you collect? How and when will you collect it?

Your research proposal should be 1-2 pages long and include a title, background information, research question(s) and methods (see example below).

Example Research Proposal

Research Proposal: Timing of Leaf Fall of Native Exotic Woody Plants

Background. Deciduous trees and shrubs in the eastern deciduous forest biome drop their leaves in the fall in advance of winter conditions. This trait is effective because little photosynthetic carbon gain is possible in winter and the mechanical stresses to the plant from snow, ice and wind are greater with foliage attached. One of the environmental cues for deciduous plants to drop their leaves is colder weather in the fall (Escudero and del Arco 1987), and plants in mountains drop their leaves earlier on colder upper slopes than warmer lower slopes (Tateno et al. 2005). Many phenological changes in plants are also influenced by changing day length, as shorter days are a reliable signal for the coming of winter. If responses to day length are innate in plant genes, then when a plant species is moved to a different region the timing of phenological responses could be disrupted. Hence, exotic species might be expected to express different timing of leaf fall than related native species.

Question: Is the timing of leaf fall the same or different between native and exotic woody plant species from the same genus?

Approach: I will compare the timing of leaf fall between native and exotic woody plant species from the same genus, growing in similar environments in central New York. I will attempt to quantify the timing of leaf fall in each species using photographs of the canopy of each selected plant at weekly intervals during the fall. A visual estimate of the proportion of leaves remaining will be made from inspection of the photographs. If possible, I might try to use an image scanner to make the estimates more quantitative. Initially, I plan to study at least three pairs of species: *Acer saccharum* vs. *A. platanoides*; *Rhamnus alnifolia* vs. *R. cathartica*; and *Fagus grandifolia* vs. *F. sylvatica*. All of these species are common in and around Cornell (e.g., Plantations). I will follow leaf fall of four selected individuals of each species. I will also try to relate leaf fall timing to weather records this fall and to the day length. By comparing these environmental cues with those in the native environment of the exotic species (Europe) I hope to gain a better understanding of controls of leaf fall phenology and possible implications for exotic plant invasions.

References:

Escudero A and del Arco JM. 1987. Ecological significance of the phenology of leaf abscission. *Oikos* 49:11-14.

Tateno R, Aikawa T and Takeda H. 2005. Leaf-fall phenology along a topography-mediated environmental gradient in a cool-temperate deciduous broad-leaved forest in Japan. *Journal of Forest Research* 10:269-274.