

Seminars on Science

IN THE FIELD WITH SPIDERS

Syllabus

Course Title

In the Field with Spiders: Classification, Anatomy and Morphology

Course Description

Spiders were hard at work long before the dinosaurs appeared and have settled everywhere on the planet except Antarctica. Most live on land, but some spend their lives on or near water. They make their homes everywhere, from treetops to underground burrows, from suburban subdivisions to tropical caves, even 22,000 feet up on Mt. Everest. Spiders are important predators that keep many ecosystems in balance.

In this life science course, students explore the concepts of morphology and classification. Learners are introduced to the anatomy of spiders, as well as the composition and use of their silk, webs, fangs, and venom. Lab, field, and collecting techniques are examined. Museum research on Australian ground spiders is also highlighted to gain insight into each of these topics.

Scientist-authored essays, online interaction, web resources and video help us to look into the lives of spiders as well as the way they are studied through lab techniques, journaling, collection, drawing, classification and identification. Learners will model these techniques by making their own spider collection.

Class Schedule

This is a six-week online graduate course with an additional week for assignment completion. The course is asynchronous and does not have specific meeting times. Assignments and discussions change on a weekly basis. Students are expected to complete work within the specific week it is assigned.

For the current schedule of offerings, please visit www.amnh.org/learn/calendar.php.

Instructors

This graduate course is co-taught by an experienced educator along with a research scientist. **For example**, a recent course featured:

Mr. Brian McKanna

Lee High School
Wyoming, MI

Dr. Vladimire Ovtsharenko

Division of Invertebrate Zoology
American Museum of Natural History

For current instructor information, please contact seminfo@amnh.org.

Format

1. **In the Field with Spiders** is a six-week online graduate course with an additional week for assignment completion. Enrollment is restricted to current or future educators.
2. **Weekly activities** include a specific question and the written and multimedia resources to explore it. Computer interactives, image galleries, and videos will help learners visualize and master the content.
3. **Online discussions** encourage reflection on course content, support and model the inquiry process, and sustain interaction between the offering scientists, seminar instructors, and course members.
4. **Final course projects** support either the development of a proposal planning how you might research a question related to a seminar topic you find particularly interesting or the creation of inquiry-based lesson plans focused on a key course concept that you might incorporate into your teaching practice.

Required Textbook

This course requires the following textbook.

Spiders and Their Kin

by Herbert Levi, Lorna Levi, Herbert Zim, & Nicholas Strekalovsky

Paperback: 160 pages

Publisher: Golden Guides (April 2001)

ISBN: 1582381569

Spiders of the World

by Rod Preston-Mafham & Ken Preston-Mafham

Hardcover: 191 pages

Publisher: Blandford (April 2003)

ISBN: 081605214X

Recommended Textbooks

The following textbooks are recommended as general references but are not required.

The Common Spiders of the United States

by James Henry Emerton

Paperback: 227 pages

Publisher: Dover Pubns (December 1961)

ISBN: 0486202232

Biology of Spiders

by Rainer F. Foelix

Paperback: 336 pages

Publisher: Oxford University Press, 2nd edition (September 1996)

ISBN: 0195095944

How to Know the Spiders

by Barbara Kaston, John Bamrick, Edward T Cawley, Wm. G Jaques, Kaston, B.J.

Spiral-bound: 288 pages

Publisher: McGraw-Hill, 3rd edition (March 1, 1978)

ISBN: 0697048985

The Red Hourglass: Lives of the Predators

by Gordon Grice

Hardcover: 240 pages

Publisher: Delacorte Press (March 9, 1998)

ISBN: 0385318871

Support Services

Technical support is available for technical issues on a 24/7 basis. Please call (303) 873-0005 or email helpdesk@amnh.college.com.

Grading

Assessments are based on a detailed grading rubric developed for this course:

Course Assignments	30%
Course Participation & Communication	40%
Final Project	30%

1. **Course assignments** will include reflection questions and written assignments.
2. **Class participation** will be evaluated based on the quality and consistency of contribution to the discussion forum. The grades for participation will be posted two weeks after each question opens.
3. **Final Project:** There are two options for the course project:

Option I: Teaching Practice

This option is for learners who would like an opportunity to develop an application based on the course content that could be taught to students or other educators. The final form may be a unit or workshop plan (if it will be used as part of a professional development experience).

Option II: Research Question

This option is for learners who would like an opportunity to further explore and grapple with the science and skills presented in this course. The task is to develop a research question of interest based on some element of the content presented in the course.

4. **Policy:** Everything submitted as an assignment, project, or discussion post must be an original work. References to resource materials are expected and proper citation is required.

Weekly Overview and Expectations

Week 1: Why study spiders?

Did you know you're almost never more than six feet away from a spider? Why do we have such strong reactions to spiders? What is their significance in our lives? This week provides an introduction to the anatomy and morphology of spiders and we meet Dr. Vladimir Ovtsharenko, an arachnologist who studies them at the American Museum of Natural History.

Expectations

- Review the course orientation.
- Reflect on why spiders are important species in terrestrial ecosystems.
- Examine basic spider morphology and anatomy.

- Explore the American Museum of Natural History's scanning electron microscopy (SEM) lab and how specimens are prepared for such microscopy.
- Review the habits of mind required for making observations.
- Participate in the Icebreaker Discussion
- Respond to the Discussion Question: Uniquely Spiders

Week 2: Why do spiders make silk and webs?

Spiders are best known for their webs, which are made of silk. Webs are often the first indicator that a spider is near and can even suggest what type of spider made it. But did you know that silk is used for far more than just webs? How do spiders use silk? Do all spiders make webs and are they all alike? Do other creatures make webs? What is the silken product made of and how is it made? How do spiders use their webs and silk in capturing prey? We address these questions and others this week as we examine the remarkable by-product of our eight-legged friends.

Expectations

- Explore the properties of silk and the various types of webs.
- Review the ways spiders use silk and how humans apply the properties of silk to technological innovation.
- Survey your local area and record observations of spiders and spider webs.
- Complete the assignment: Spider Observation, which includes the set-up of a Field Journal
- Respond to the Discussion Question: Making Silk
- Respond to the Discussion Question: Using Silk

Week 3: How do spiders bite?

Almost all spiders produce venom, but not all venom is alike. How scared should you be of a spider's bite? The few spiders whose bite is toxic to humans have received a disproportionate amount of publicity. How do spiders use their venom? How deadly is the poison? This week we take a close look at where venom production takes place and what we know of the chemical composition of venom. We read a brief introduction to how dangerous some of the most well-known spiders are to humans and other organisms.

Expectations

- Investigate the various types of venom produced by spiders.
- Study several examples of venomous spiders found in the United States.
- Assess the reality of the danger to humans from spiders.
- Analyze a firsthand account of a researcher who was intentionally bitten by a black widow.
- Respond to the Discussion Question: Focus on Spider Venom
- Respond to the Discussion Question: Lessons from a Black Widow
- Share preliminary thoughts on the content of the Final Project

Week 4: What field methods do arachnologists use?

Get ready to head outdoors and do some spider observation and collection this week. How do you capture what you see in the field? There are two ways: recording observations and collecting spiders. Two AMNH staff members share a few tricks of the trade about scientific illustration, particularly for sketching in the field. Then we explore the characteristics of a good field journal, one of the most important tools scientists use to record everything they find, observe, and collect. And finally, Dr. Ovtsharenko shares a few of the various techniques arachnologists use to collect spiders.

Expectations

- Learn several of the tools and techniques used to collect spiders.
- Begin your own spider collection using these methods.
- Practice skills in the collection, observation, description, and illustration of spiders.
- Respond to the Discussion Question: Field Methods
- Complete the Assignment: Collecting and Identifying Spiders, Part 1

Week 5: What laboratory methods do arachnologists use?

Now that you've collected a few spiders, how do you know which species you have found? Sometimes you may recognize the species, but what if you don't? How do you begin to identify your spider? This week we discuss how to maintain a specimen collection from your work in the field last week. Then Dr. Ovtsharenko walks us through the steps involved and the tools available for making a positive identification for your spiders.

Expectations

- Learn about and use field guides and dichotomous keys for the classification of spiders.
- Sort spiders according to morphological characteristics.
- Examine SEM images of a ground spider to view the anatomical characters used when identifying spiders.
- Respond to the Discussion Question: Spiders through a Lens
- Complete the Assignment: Collecting and Identifying Spiders Part 2
- Submit an outline for the Final Project

Week 6: What research priorities should we have for spiders?

Their sheer numbers make spiders vital in maintaining the balance of nature. Over 36,000 species have been described, but they represent only a third to a half of those that still await discovery. And that's where the work of Dr. Ovtsharenko and his colleagues at the American Museum of Natural History comes in. This week, Dr. Ovtsharenko recounts a 1998 expedition to Australia to identify the estimated 650 spider species endemic to Australia. We round out the course with a closer look at the distribution of spiders around the globe.

Expectations

- Explore systematics—the branch of science that discovers and describes new species.
- Tour the world-renowned Arachnology collection of the AMNH.
- Review an account of Dr. Ovtsharenko's recent expedition to collect and inventory spider species endemic to Australia.
- View specimens and photos from Dr. Vladimir Ovtsharenko's recent spider-collecting trips.
- Learn about the global distribution (biogeography) of spiders.
- Respond to the Discussion Question: Museum Collections
- Submit the Final Project