# Viewing: IB 104 : Animal Biology

Last approved: 05/03/23 3:54 am

Last edit: 04/05/23 4:14 pm

Catalog Pages referencing this course

ANSC - Animal Sciences
CPSC - Crop Sciences
Natural Resources & Environmental Sciences, BS
Natural Resources & Environmental Sciences: Ecosystem Stewardship & Restoration Ecology, BS
Natural Resources & Environmental Sciences: Environmental Science & Management, BS
Natural Resources & Environmental Sciences: Fish, Wildlife & Conservation Biology, BS
Natural Resources & Environmental Sciences: Human Dimensions of the Environment, BS

## History

1. Jan 18, 2023 by Allison O'Dwyer (aodwyer)
2. May 3, 2023 by Allison O'Dwyer (aodwyer)

## General Information

| | |
|---|---|
| Effective Term: | |
| College: | Liberal Arts & Sciences |
| Department/Unit Name (ORG Code): | School of Integrative Biology (1383) |
| Course Subject: | Integrative Biology (IB) |
| Course Number: | 104 |
| Course Title: | |
| Abbreviated Title: | Animal Biology |

Course Description:

Introductory zoological concepts with emphasis on the diversity and comparative anatomy of animals and the fundamentals of physiology, genetics, evolution, and behavior. Lecture and laboratory.

## Justification

Justification for change:

Please Note: a syllabus is required for General Education review:

# Course Information

## Course Credit

Course credit:

Undergraduate: 4

Graduate:

Professional:

**Registrar Use Only:**

Banner Credit: 0 OR 4

Billable Hours: 0 OR 4

## Grading Type

Grading type: Letter Grade

Alternate Grading Type (optional):

Available for DFR: No

## Repeatability

May this course be repeated? No

## Credit Restrictions

Credit Restrictions:

## Advisory Statements

Prerequisites:

Concurrent Enrollment Statement:

Restricted Audience Statement:

### Cross-listing

Cross Listed Courses:

### Class Schedule Information

Class Schedule Information:
Students must register for one lab and one lecture section.

### Fees

Is a fee requested for this course? No

## Course Description in the Catalog Entry

This is how the above information will be represented in the Catalog:

Introductory zoological concepts with emphasis on the diversity and comparative anatomy of animals and the fundamentals of physiology, genetics, evolution, and behavior. Lecture and laboratory.

### Additional Course Notes

Enter any other course information details to be included in the catalog:

## Course Detail

| | |
|---|---|
| Frequency of course: | Every Fall |
| Duration of the course | Full |
| Anticipated Enrollment: | 144 |

| | Freshman: | Sophomore: | Junior: | Senior: |
|---|---|---|---|---|
| Expected distribution of student registration: | 50 % | 50 % | N/A | N/A |

# General Education

General Education Category: Life Sciences

## General Information

Is the course required for a major concentration? No

Is the course part of a sequence? No

What is the frequency with which the course will be offered?:
*(For Example: every semester, once a year)*

Every fall

Briefly describe how the course fulfills the General Education objectives:

Animal Biology is an introductory biology course that focuses on the fundamentals of cell biology (cellular respiration/bioenergetics) anatomy (growth and differentiation), physiology (metabolism), genetics (mitosis and meiosis), evolution (speciation), diversity, ecology, and behavior (ethology). [Topics in parenthesis are examples of the subjects covered under each of the units]

In this course, students learn how human knowledge of genetics has changed through time. Before Mendel's experiments, it was thought that traits in offspring resulted from a blending of the traits of each parent. In this course, students learn about Mendel’s experiments and that offspring may look like either one of the parent plants, not a blend of the two. Students are introduced to modern genetics by studying processes such as epistasis, for example, where two or more genes interact to produce variation in color in different animals and plants. Students are introduced to the complex process of genetic recombination which has led to major findings such as locating individual genes on chromosomes.

This course emphasizes the application of the scientific method to all areas of biology. Students are presented with a wide variety of questions and case studies. To answer these questions, students not only need to know biological concepts, but they also need to apply critical thinking skills. Students need to evaluate the given statements, apply the concepts to different scenarios, and support their choices. Students apply the scientific method in order to understand simple events occurring in their daily lives as well as complex biological processes. For example, students evaluate studies on the use of alternative medicines, learn about placebos, controls, sample sizes, replication, randomization, and double-blind experiments, discuss with classmates, and come to a conclusion from a scientific perspective. Given a study, students identify what is missing to make it a well-designed experiment. In the context of vaccines, students learn to distinguish between science and pseudoscience, discuss anecdotal evidence and superstitions, and come up with their own examples. Students are presented with research published in the scientific literature and are asked to interpret experimental results and to go beyond the frame of those studies by proposing further studies. Furthermore, students follow the scientific method in three different lab activities: observations of squirrel behavior in the field, a semester-long experiment using isopods (a marine invertebrate), and an activity involving cicadas (a terrestrial invertebrate). Given that the scientific method is a structure mode of critical thinking, the emphasis on the scientific process encourages the development and application of critical thinking skills.

This course encourages the development of graphic skills. Students learn when and how to use different types of graphs. Students are presented with graphs published in the scientific literature and are asked to interpret them and to decide whether these support or reject the proposed hypotheses. Students collect their own data (from squirrels, isopods, and cicadas) and plot graphs that display the characteristics of these populations.

Animal Biology follows a flipped classroom approach. Students watched videos from different sources before attending the lecture. Many of these videos are made by women. Among other activities, students review the work by scientists, including important contributions made by women. For example, 1) Lynn Margulis, transformed the current understanding of the evolution of eukaryotic cells by proposing it to have been the result of endosymbiotic bacteria (Lecture 5), 2) Rosalind Franklin whose work on the X-ray diffraction images of DNA led to the discovery of the DNA double helix (Lecture 7), 3) Rachel Carson, the author of Silent Spring. In our "Ecosystem ecology 1" lecture (Lecture 35), we discuss how this book spurred a reversal in national pesticide policies, which led to a nationwide ban on DDT and other pesticides, 4) Mollie Beattie, conservationist and the first female director of the U.S. Fish and Wildlife Services. Beattie was a champion of the Endangered Species Act. In our "Ecosystem ecology 2" lecture we discuss one of Beattie's biggest achievements in conservation,

her involvement in the successful reintroduction of the grey wolf to the northern Rocky Mountains.

In lecture and lab, gender inclusive language is used. Students are addressed by their preferred pronouns. Lab activities includes gender inclusive language. For instance, instead of using this language "men produce sperm and women produce eggs", the lab handout says: "sperm producing individuals and egg producing individuals". In lecture, the complexity of sex determination is explored by studying the clown fish life cycle, the biology underlying of Turner and Klinefelter syndromes (i.e., conditions in humans from birth involving atypical arrangements of chromosomes), and how in some species of reptiles' sex is not determined by chromosomes but instead by environmental temperature.

Student agency: students give feedback through early feedback surveys in lecture. In lab, students choose the topics of their semester-long project and presentations.

Describe the instructional format and provide special justification, if necessary:

Animal Biology includes lecture and labs. The lecture follows a flipped classroom format. In preparation for lecture, students watch videos that cover the fundamental concepts associated with that lecture. Videos do not exceed 30 minutes in length. After watching the videos and before meeting for lecture, students take quizzes to assess the understanding of basic concepts. Time in lecture is devoted to summarizing main concepts, solving challenging questions, and working on different types of activities in preparation for the exams. Lecture activities foster the development and use of critical thinking skills by presenting students with a wide variety of questions and case studies. To answer these questions students not only need to know biological concepts, but they also need to apply another set of skills. Students need to evaluate the given statements, apply the concepts to different scenarios, and support their choices. Example: For the topics of mitosis and meiosis, students watch videos that explain the fundamentals of these processes (for instance: steps in the process and number of cells formed) and then take a low-stake quiz. Quizzes correspond to the low levels on the Bloom taxonomy scale. In lecture, through discussion and practice problems students compare and contrast mitosis and meiosis, understand their biological significance, learn what happens when things go wrong, and relate mitosis and meiosis to concepts covered before such as DNA structure and replication. Lecture activities correspond to the higher levels on the Bloom taxonomy scale.
Multiple studies have shown the advantages of the flipped classroom method across all disciplines (Barral et al. 2018, Akçayıra and Murat Akçayırb 2018, Malto et al. 2018, Tang et al. 2020, Bredow et al. 2021)

Labs follow closely what is covered in lecture. Lab activities also include the collection of data in the field by observing squirrel behavior outside the Natural History Building. Students also work in groups in semester-long projects to collect data on isopod physiology and behavior following the steps of the scientific method. Data are collected

and statistically analyzed, and students write a report and present their results to the class. The same applies to the cicada activity. Students determine cicada sex, density, and tree preferences, run statistical analysis, and present their results. In lab, students run computer simulations to understand the evolutionary mechanism of genetic drift.

Students enrolling in Animal Biology attend one lecture hour three times per week, with a laboratory section that meets for three hours one time per week, and gives 4 credit hours. Lecture and labs meet in person. Enrollment in lab sections is capped at 24 students which allows for substantial active participation by each student.

We are requesting the General Education certification for IB 104 due to the recent removal of vertebrate dissection from the course.

Describe the means by which the Communication Skills goal will be achieved:

Labs require active student participation. Students work on several group projects (squirrel behavior, isopod physiology and behavior, and cicada ecology). Students develop their writing and communication skills by writing reports and presenting the results to the rest of the class. Students receive feedback throughout the semester to improve these skills.

As lab sections are capped at 24 students, IB 104 Animal Biology sufficiently meets standards for faculty-student ratios.

Describe how evaluation and adherence to General Education guidelines will be monitored:
*Please indicate the timeline for such evaluations*

The course instructor will continue to meet periodically with the SIB Associate Director for Academic Affairs, Dr. Brian Allan, to discuss the structure of the Animal Biology course.
Timeline: Meetings will be held before, during, and after the course is offered.

To assess and improve student learning, IB 104 will continue to provide learning outcomes in the syllabus, and the instructor will refer to them throughout the semester so students are aware of what they will be learning and why. The instructor will also provide an anonymous, mid-semester, student evaluation. IB 104 also includes a variety of formative and summative assessments such as quizzes, unit exams, end of the semester lab projects, written reports, and oral presentations. To signify that students have achieved the stated learning outcomes, the Associate Director for Academic Affairs and the instructor will analyze students grades in conjunction with peer feedback, mid-semester, and end-of-course anonymous feedback from ICES. Based on this analysis of the assessment work, course curricula may be revised, learning outcomes modified, and student facilitation improved. As a General Education credit course, IB 104 will also be thoroughly reviewed and re-certified on a regular basis by the General Education Board.

Indicate those who will teach the course and describe procedures for training & supervising teaching assistants:

Dr. Lily Arias, specialized faculty lecturer, teaches the lectures and coordinate the labs for IB 104. Dr. Arias has taught this course for 6 years. The labs are taught by graduate teaching assistants under the lecture instructor's direct supervision. Teaching assistants are trained in active learning and inclusive practices prior to teaching the course. Teaching assistants meet with the lecture instructor every week to receive guidance or support. Teaching assistants are supervised frequently and will be trained on the General Education objectives within this course. Teaching assistants are also evaluated on a regular basis with feedback provided informally from their course supervisor/instructor, as well as formally evaluated at end-of-semester by the course instructor. This evaluation data is then used to determine best fits for future teaching assistant assignments. No undergraduate students work as teaching assistants.

## Natural Science & Technology - Life Sciences

Show that the course presents fundamentals of the life sciences, or has as a prerequisite a college course in fundamentals of the life sciences.

Animal Biology is an introductory biology course that focuses on the fundamentals of cytology, anatomy, physiology, genetics, evolution, diversity, ecology, and behavior. This course emphasizes the application of the scientific method to all areas of biology and the development of critical thinking skills.

In Animal Biology students learn fundamental concepts in Genetics such as the role of genes and DNA. They also learn the origin of common genetic conditions such as Down syndrome and others. In the Ecology unit, students learn the causes of global warming and climate change and their impact on ecological communities. In the Evolution unit, students learn about natural selection and speciation and in lab they learn to build phylogenetic trees. In the Diversity and Anatomy units, students learn about the main characteristics of diverse groups of animals and in lab, they learn about the most common species of vertebrates in Illinois.

Show that the course emphasizes the scientific method, including making observations, evaluating data, and solving problems.

In Animal Biology, lessons include a strong emphasis on understanding and applying the scientific method and on fostering critical thinking skills.
The first week of classes, students learn different aspects of the scientific method and apply it throughout the semester in a variety of lecture and lab lessons and activities. Through the discussion of different examples students learn subjects such as the differences between science and pseudoscience, bias in science, hypotheses and

theories, and more.
In lecture, the scientific method is applied mostly in the Ecology unit. Students first learn how the scientific method can be used to solve problems in their daily lives. Through questions related to their daily activities, the elements of the scientific method are introduced. Then, students are presented with statements related to ecological research where they have to identify the steps of the scientific method. Finally, students are presented with data from real research. Students analyze every single step of the scientific method, with emphasis on data collection and analysis of results.

An example of a lab activity where students make observations and evaluate data is the "cicadas lab". Students learn about the natural history of cicadas, collect data regarding body size, sex, and preferred tree species in Illinois. Then, students communicate their statistical analysis and reveal their data through charts and graphs that display characteristics of the cicada population surveyed.
Another example of data collection is the "PTC lab" where students collect samples of their own saliva for genetic testing. After performing several lab techniques students analyze the results and learn what their own genotypes are.
In the "Data nugget" activity, students analyze data collected from scientists and work their way backward to find what the research question and hypothesis were. With the results given, students propose and then communicate new lines of research.

## Additional Course Information

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| Does this course replace an existing course? | No |
| Does this course impact other courses? | No |
| Does the addition of this course impact the departmental curriculum? | No |
| Has this course been offered as a special topics or other type of experimental course? | No |
| Will this course be | |

offered on-line?
Face-to-Face

Faculty members who will teach this course:
Lily Arias

Course ID: 1001349

Comments to Reviewers:

Course Edits Proposed by:

Key: 5232