

## **Term Information**

Effective Term Spring 2015

## **General Information**

Course Bulletin Listing/Subject Area Evol, Ecology & Organismal Bio  
Fiscal Unit/Academic Org Evolution, Ecology & Org Bio - D0390  
College/Academic Group Arts and Sciences  
Level/Career Undergraduate  
Course Number/Catalog 3494  
Course Title Entering Independent Research  
Transcript Abbreviation Enter Indep Res  
Course Description This course is designed to equip students in the Natural and Mathematical Sciences with necessary skills to become independent researchers. The main emphasis is given to experimental methods, experimental and quasi-experimental design, hypothesis testing, sampling, research ethics, basic statistics, and presentation of data.  
Semester Credit Hours/Units Fixed: 3

## **Offering Information**

Length Of Course 14 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Columbus

## **Prerequisites and Exclusions**

Prerequisites/Corequisites  
Exclusions Not open to seniors

## **Cross-Listings**

Cross-Listings

## **Subject/CIP Code**

Subject/CIP Code 26.0701  
Subsidy Level Baccalaureate Course  
Intended Rank Freshman, Sophomore, Junior

## Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

## Course Details

### Course goals or learning objectives/outcomes

- Students will learn basic principles of experimental research
- Students will be able to design their own projects, lay out an implementation plan, and apply for funding
- Students will be able to use statistics and data analyses tools for their proposed study
- Students will gain necessary communication and critical thinking skills for scientific inquiry
- Students will gain a greater understanding of animal diversity and address broader implications of a research question

### Content Topic List

- Introduction to research methods in Natural and Behavioral sciences with emphasis on experimental and quasi-experimental designs
- Research Ethics
- Hypothesis testing, sampling, and statistical analyses
- Presentation skills
- Grant writing
- Outreach engagement in local grade schools

## Attachments

- EEOB 3494 Syllabus.docx: Syllabus

*(Syllabus. Owner: Lanno,Roman P.)*

## Comments

- This course will replace the 3194 one-time offering of this course *(by Lanno,Roman P. on 04/03/2014 09:39 AM)*
- See e-mail to R. Lanno. Use the create one-time course request option--not create a new course. *(by*

*Vankeerbergen,Bernadette Chantal on 04/01/2014 02:39 PM)*

## Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Lanno,Roman P.	03/31/2014 05:11 PM	Submitted for Approval
Approved	Lanno,Roman P.	03/31/2014 05:11 PM	Unit Approval
Approved	Hadad,Christopher Martin	03/31/2014 05:25 PM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	04/01/2014 02:39 PM	ASCCAO Approval
Submitted	Lanno,Roman P.	04/03/2014 09:40 AM	Submitted for Approval
Approved	Lanno,Roman P.	04/03/2014 09:40 AM	Unit Approval
Approved	Hadad,Christopher Martin	04/03/2014 09:44 AM	College Approval
Pending Approval	Vankeerbergen,Bernadette Chantal Nolen,Dawn Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole Hanlin,Deborah Kay	04/03/2014 09:44 AM	ASCCAO Approval

**EEOB 3494 – ENTERING INDEPENDENT RESEARCH  
3 CREDIT HOURS  
FALL 2014**

**TENTATIVE SYLLABUS**

**Lecture:** Tuesday and Thursday 12:45-2:05 pm – TBA

**Instructor:** Dr. Zeynep Benderlioglu

**Office:** 717 Biological Sciences Green Houses, 332 W. 12<sup>th</sup> Ave., Mailbox: AL 300, 318 W. 12<sup>th</sup> Ave.

**Office Hours:** By appointment

**e-mail:** [benderlioglu.1@osu.edu](mailto:benderlioglu.1@osu.edu)

**Phone:** 614 292 5965

**Textbooks:** Selected on-line book chapters can be purchased through the publishers' web site:

1. *Statistics for the Behavioral Sciences*, 2nd ed. 2010, Nolan SA, Heinzen TE, Worth., ISBN-13: 978-1-4292-3265-4 Web link:

<http://worthpublishers.com/Catalog/product/statisticsforthebehavioralsciences-secondedition-nolan/formatsandpackages/studentpurchaseoptions>

**Chp2 & Chps 6-16.**

2. *Research Methods*, 8th ed. 2010. McBurney & White, Wadsworth Publishers, ISBN-13: 9780495602194 Web link: <http://www.cengagebrain.com/shop/isbn/9780495602194>

**Chps 2-8, Chps 11-14, & Appendix A**

3. *Research Design and Methods: A Process Approach*, 8th ed. 2011. Bordens K, Abbott BB, ISBN-13: 978-0-07-353202-8 McGraw-Hill. Web link: <https://create.mcgraw-hill.com/shop/>

**Chp 11 & Chp 16.**

**Statistics Textbook:**

4. *Applied Statistics and the SAS Programming Language 5<sup>th</sup> Edition* (hard copy). 2006. Cody, R, Smith J. Pearson/Prentice Hall.

**Course Description**

This course is designed to equip students in the Natural and Mathematical Sciences with necessary skills to become independent researchers. The main emphasis is given to experimental methods. Live arthropods are used in the classroom to help develop student research projects. Related topics will include experimental and quasi-experimental design, hypothesis testing, sampling, and research ethics.

Basic statistics, data analysis using SAS statistical software, as well as Power Point, and Excel graphing tools for presentation of data will also be given throughout the course. As research funding is an essential part of conducting experimental studies, students will be guided through the process of grant writing. Dissemination of knowledge is an integral part of the scientific inquiry. Accordingly, an outreach program is also implemented in this course. Students will be participating in service learning designed for local grade schools. They engage grade students in hands-on activities, and conduct experiments with arthropods.

Learning Objectives:

- a. Students will learn basic principles of experimental research
- b. Students will be able to design their own projects, lay out an implementation plan, and apply for funding
- c. Students will be able to use statistics and data analyses tools for their proposed study
- d. Students will gain necessary communication and critical thinking skills for scientific inquiry
- e. Students will gain a greater understanding of animal diversity and address broader implications of a research question

**Course Website:** <https://carmen.osu.edu/>

The address printed here will bring you to the login page for Carmen. If you are unfamiliar with CARMEN, instructions are available at the Center for Life Sciences Education office (260 Jennings Hall).

**Electronic Communication:** Students are welcome and encouraged to e-mail the instructor. Course updates and other course related communication will be posted on CARMEN and will be distributed as a course-wide email to all name.#'s registered for the course. It is expected that all students will check their e-mail and CARMEN web site regularly for updates, lecture notes, hands-out and assignments.

### Evaluation

There will be seven homework assignments throughout the Semester. The students will also engage in outreach activities for local grade schools. In addition, each student will orally present a research proposal in class. As the Semester progresses, students will develop their proposals into fully written grants for potential funding. A week from an assignment's due date, a handout on how to complete the assignment will be posted on Carmen. These guidelines should be followed closely as they constitute what your homework should cover and what sources you should be using. The grades will be assessed according to the following scheme:

**1. Outreach (10 points total).**

- a. Presentations/engagement in hands-on activities with grade schools (5 points).

**Important Note:** You can NOT earn this credit if you did not complete signature animal factsheet below.

- b. Signature animal factsheet for outreach activities (5 points).

**Important Note:** You can NOT earn this credit if you are not present in outreach activities involving local schools [see item a) above].

**2. Homework assignment # 1: Research Databases and Literature Review (5 points)**

**3. Homework assignment # 2: Article Examination (5 points)**

4. Homework assignment # 3: Design an Experiment (**10 points**)

5. Homework assignment # 4: Budget Proposal (**5 points**)

6. Homework assignment # 5: Statistics – Part I (**5 points**)

7. Homework assignment # 6: Statistics – Part II (**5 points**)

8. Homework assignment # 7: Graphs/Stats - Part III (**5 points**)

9. Oral Presentations (**15 points**)

10. Grant Proposal (**20 points**)

11. Attendance (includes class participation) (**15 points**)

**Total: 100 points**

**Grade Scale:** Your final grade will be based on the following scale:

94-100	A
90-93	A-
87-89	B+
84-86	B
80-83	B-
77-79	C+
74-76	C
70-73	C-
67-69	D+
60-66	D
59 and below	E

There are no extra credits. However, minor adjustments may be made on the basis of improvement and/or participation. Course policies regarding the assignments are outlined below.

### **Course Policies**

**Late Assignments:** It is extremely important that you follow the deadlines. If you were to apply for research money, the funding agencies would not accept your proposal after the due dates. Similarly, if you were scheduled to give a talk and did not show up on time, it will have important adverse consequences for your future career. In order to emphasize this point, I will not accept late assignments. Failure to deliver your proposal, or show up for your presentation will result in **0 points** for the subject assignment. If you were too ill to complete an assignment, you are required to contact me within 24 hours of the class period in which the assignment was due. You must provide written documentation from a medical unit regarding the illness covering the assignment period. If you had other excuses that are personal in nature, I will consider those on an individual basis. I will reserve the right to decide what constitutes a "legitimate excuse." Lack of transportation, travel to sports, or family events are NOT considered legitimate excuses. You are given ample time for preparing a proposal and flexibility in scheduling your presentation. Please plan accordingly.

**Codes of Conduct in Class:** This class involves interactive hands-on activities with laboratory animals, in-class discussions, and working with grade schools. Therefore, please consider the following:

- a. Be on time. Late arrivals and early departures are very disruptive, especially if you are visiting a school, or, someone is presenting in class.
- b. Be respectful of the animals you are working with. If you are uncomfortable with studying any of the animals, let the instructor know. You will NOT handle any animal that would sting or bite you under any circumstances.
- c. Turn off your cell phone, beeper, smartphone, and any other device that you text, or listen to. Use of such devices is strictly prohibited in class.
- d. Be patient with kids, respectful to teachers, and school property. Your job is to instill curiosity in young minds, NOT fear. Some kids will scream when you show the animals. Gently guide them to the interesting facts about the animals. Don't worry if you are uncomfortable yourself. Your instructor, or, a designated person will be supervising the activities and doing the handling, if necessary.

**Class participation:** Attendance and participation in class and recitation hours are essential to succeed in this course. There are no exams. Accordingly, through participation, hands-on training with laboratory animals, observation of your peers presenting in class, critiquing scientific work, and listening to guest speakers will equip you to become independent researchers in your own right. To emphasize this point attendance is worth 15 percent of the total grade. You can be absent for 2 class periods without any excuse and loss of points. Otherwise, the same policies apply regarding late class assignments.

**Grade Inquiries:** Grades will be posted to the course site on Carmen. You will have 14 days from the date the grade is posted to challenge any grade or inquire about a missing grade; after that time the grade becomes final, no exceptions.

Miscellaneous items:

Food and drink: Food and drink are strictly prohibited in the laboratory

Cell phones: All electronic devices must be turned off during class. No calls, no texts, no earpieces are allowed, and please keep the web-surfing to a minimum if you use your laptop for notes.

### University Policies

Academic misconduct:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Accessibility:

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901 <http://www.ods.ohio-state.edu/>

**Errors & Omissions:** This syllabus may be altered in the event that guest speaker, student and local school schedules change, and animal deliveries are not made on time by the vendor. Corrected versions will be posted on CARMEN

### Weekly Schedule

Week	Date	Lecture	Assignments
1	R Aug 28	Introduction to Research Methods	
2	T Sep 2	Discovery Time, Signature Animals, Introduction to Outreach Programs	
	R Sep 4	Research Methods Cont'd, Validity , Confounds, Reliability, Sampling	
3	T Sep 9	Experimental, Quasi-Experimental Designs, Randomization, Hypothesis Testing, Independent and Dependent Variables	<b>Signature Animal Factsheet Due (Outreach engagement will be announced later based on student schedules)</b>
	R Sep 11	Controlling the Confounds	
4	T Sep 16	Non-experimental Designs	
	R Sep 18	Deductive and Inductive Reasoning: Termite Behavior	
5	T Sep 23	Research Databases, Literature Review	<b>Article Examination Due</b>
	R Sep 25	Green House Visit	
6	T Sep 30	Research Ethics	<b>Literature Review Assignment Due</b>
	R Oct 2	Design an Experiment	<b>Outreach Local School Visit 6-8 pm</b>
7	T Oct 7	Power Point Tools for Oral Presentations	
	R Oct 9	Descriptive Statistics: Frequency Tables, Distributions, Central Tendency	<b>Design an Experiment Due</b>
8	T Oct 14	Intro to SAS	
	R Oct 16	<b>Student Presentations</b>	
9	T Oct 21	<b>Student Presentations</b>	
	R Oct 23	<b>Student Presentations</b>	
10	T Oct 28	Inferential Statistics, Review of Hypothesis Testing, Meaning of $p$	
	R Oct 30	Guest Speaker: Jeff Agnoli, Office of Research Funding Opportunities, Finding the Right Lab	
11	T Nov 4	T-tests, One-Way ANOVA, Non-parametric Statistics with SAS	
	R Nov 6	Correlation and Regression with SAS	
12	T Nov 11	<b>No Class – Columbus Day</b>	
	R Nov 13	Abstract Writing, Budget Preparation	
13	T Nov 18	Two-way Within/Between Subject ANOVA	<b>Statistics Homework 1 Due</b>
	R Nov 20	Multiple Regression with SAS	
14	T Nov 25	Grant Writing	<b>Budget Proposal Due</b>
	R Nov 27	<b>No Class – Thanksgiving Holiday</b>	
15	T Dec 2	Factorial Designs	<b>Statistics Homework 2 Due</b>
	R Dec 4	Reporting Your Results	
16	T Dec 9	Review	<b>Statistics Homework 3 Due</b>
17	T 16	<b>Final</b>	<b>Final Grant Proposal Due at 2 pm</b>

