

BULLETIN DESCRIPTION:

An introduction to animal behavior research methods using structured observations and experiments in laboratory and field settings.

INTRODUCTION TO THE COURSE:

In this course, students are introduced to, and gain experience of, almost all the activities engaged in by scientific researchers, from initial selection of study subject, through design and conducting of hypothesis-testing observational and experimental studies, to statistical analysis of data, and final oral and written communication of findings (including effective visual. presentation of results). Behaviors of animals in the laboratory and field will be the phenomena used to engage in these activities. At the conclusion of the course, students should have the knowledge and confidence to participate in quality independent research at the advanced undergraduate or graduate school level.

<u>DATE:</u>	<u>BATESON & MARTIN PAGES</u>	<u>MINI-LECTURE TOPIC</u>	<u>LAB ACTIVITY</u>
1-18/201-4, 29-40		Choosing a Subject	Constructing an Ethogram - House Crickets
1-25/274-10, 29-56, 79-91, 146-151		Variables & Measures	Dominance & Courtship - House Crickets
2-1/3	57-61, 94-109	Observation Times; Sampling & Recording Rules	Orientation - House Crickets & Mealworm Beetles
2-8/10	110-146, 152-171	Recording Media; Reliability & Validity; Individual Differences	Pheromone-stimulated Kinesis in Cockroaches
2-15/1791-93, 172-179		Fundamental Statistical Concepts	Sensory/Behavioral Thresholds - Taste Perception in Flesh Flies
2-22/24179-201		Inferential Statistics & Data Presentation	Perceptual Processing - Reaction Times; Dilution/Confusion/Odd Prey Effects
3-1/3	11-28, 63-78, 201-215	Data Analysis & Presentation Practice	Optimal Foraging - "The M & M Lab"
3-15/17			Henry Doorly Zoo - Overview I

3-22/24	Henry Doorly Zoo - Overview II
3-29/31	Henry Doorly Zoo - Pilot Observations
4-5/7	Henry Doorly Zoo - Independent Project Week I
4-12/14	Henry Doorly Zoo - Independent Project Week II
4-19/21	Field Trip - Heron Haven or Fontenelle Forest
4-26/28	Zoo Projects Colloquium

<u>POINTS:</u>		<u>GRADES:</u>		
Quizzes (6)	60	A	=	93%
Literature Critiques (2)	30	A-	=	90%
Lab Research Paper	80 (40/40)	B+	=	87%
Statistical Analysis Exercise	20	B	=	83%
Zoo Project Proposal	15	B-	=	80%
Zoo Research Talk	30	C+	=	77%
Zoo Research Paper	35	C	=	73%
Notebook	30 (15/15)	C-	=	70%
		D	=	65%
		F	=	Below 65%
TOTAL	300			

DUE DATES:

Literature Critiques	2-1/3, 2-22/24
Statistical Analysis Exercise	3-15/17
Zoo Project Proposal	3-27
Lab Research Report	4-1 (1st draft), 4-22 (final draft)
Zoo Research Paper	5-6 (Friday of Finals Week; this constitutes your "final exam" for this course)
Notebook	3-4 & 5-6

TEXTBOOK:

M. Bateson & P. Martin. 2021. *Measuring Behaviour: An Introductory Guide* (4th ed.). Cambridge University Press; Cambridge, England.

OBJECTIVES OF THE COURSE:

BIO/EVS 372 has six major objectives:

- (1) The first, and most important, is to give students experience of almost all the stages involved in the carrying out of scientific research projects, using animal behavior as a representative field of scientific research. In fact, a more accurate (although cumbersome) name for the course would be Animal Behavior Research Methods Laboratory. At the end of the course, students should be familiar with the steps of biological research, from selecting a subject to presenting the results, should have some idea of the complexity of real behavior and the difficulties and pleasures of attempting to study it, and should feel confident about beginning full-scale research investigations of their own in the area of natural or social science that is their own particular interest.
- (2) A second objective, arising out of the first, is to provide the students with experience in writing and other forms of communication appropriate to the scientific disciplines: analyzing published papers, keeping a research notebook, preparing manuscripts of research findings for submission to scientific journals, presenting results via oral presentations.
- (3) A third objective, in fulfillment of the course's Magis Core Statistical Reasoning Designation, is to provide students with the opportunity to gain a basic understanding and experience of statistical analysis and visual representation of the quantitative results of experimental and observational studies of animal behavior.
- (4) The fourth objective is to introduce students to actual examples of animal behavior, to complement the lectures presented in BIO/EVS 371.
- (5) The fifth objective is to bring to the attention of students the ethical issues involved in carrying out research with living animals as subjects.
- (6) Finally, it is an objective of the course to raise the students' awareness of animal behavior going on all around them, to give them an enriched appreciation of the animals they encounter in their everyday lives and an enhanced commitment to the conservation of wild animals and their natural environments.

MAGIS CORE OBJECTIVES (STATISTICAL REASONING DESIGNATION):

- 2.R.3: Students will draw qualified conclusions and discuss meaningful interpretations from their statistical analysis of quantitative information.
- 3D.R.1 Students will correctly produce discipline-appropriate graphical representation of quantitative information.

3D.R.2: Students will apply correctly perform discipline-appropriate statistical analysis to evaluation quantitative information.

FIT OF COURSE TO MAGIS CORE AND UNIVERSITY & COLLEGE OF ARTS & SCIENCES MISSION:

Mathematics has been a central discipline within Jesuit education from the very beginning. Mathematics and statistics play a central role in sophisticated understanding of the world around us. Quantitative literacy is essential to understanding complex issues in everyday and professional life. In science, effective communication of results is a critical activity, and statistical analysis and support for conclusions with respect to hypotheses is an absolutely required aspect. This course gives students experience in designing experimental and observational studies in a way suitable for later statistical analysis, analyzing obtained data adequately and appropriately, drawing valid conclusions from data with respect to hypotheses tested, and presenting research results verbally, statistically, and visually, appropriately and effectively. In this way, it helps prepare them for future activities in the scientific or health professional worlds where that is their career pathway, or more generally for valid and effective understanding of quantitative material in all aspects of their everyday lives as liberally- and Jesuit-educated citizens.

BRIEF DESCRIPTION OF ASSIGNMENTS: (Full descriptions of most are provided in specific sections of the lab manual.)

Quizzes: Cover the material discussed in the Bateson & Martin-based "mini-lectures" from the previous week or specifically-assigned outside readings, highlights of the previous week's in-lab experiment, and general features of that day's in-lab experiment.

Literature Critiques: Analysis of two papers published in *Animal Behaviour* journal, with emphasis on the scientific methodology: background information, hypotheses, experimental/observational procedures, statistical analysis, presentation of results in text, tables, and figures; discussion of results and conclusions with respect to hypotheses tested. This exercise is intended to provide experience in the kind of "peer review" of journal manuscript submissions or grant proposals that is an expected part of a scientist's professional activities.

Lab Notebook: Maintenance of a complete record of research activities in the lab or field, as required by good scientific practice and by grant agencies. To include all ideas, procedures, data, analyses, and conclusions from in-lab experiments, field trip observations, and independent zoo project. Evaluated at mid-semester and at the end of the semester.

Statistical Analysis Exercise: Students will be given a data set from an in-lab experiment from a previous year, and each student individually will be required to (1) Identify appropriate descriptive statistics for those data; (2) Identify appropriate inferential statistical tests to perform on those data, explaining the reasons for selection of those tests; (3) present the appropriate descriptive statistics for that data set and conduct the appropriate inferential statistical tests, presenting conclusions from them with regard to the hypotheses tested, and (4) Sketch (with complete labels and legends) figure formats appropriate for visual presentation of these data in a scientific paper or oral presentation. This exercise is intended to allow the student to apply the material discussed in the three "mini-lectures" devoted to data analysis and presentation, and the two literature critiques conducted. It will prepare the student for incorporation of appropriate data analysis and presentation aspects of the Lab Research Paper, Zoo Project Protocol, Zoo Project Oral Presentation, and Zoo Project Research Paper assignments later in the semester. This assignment comprises the "artifact" with respect to the course qualifying as a Designated Statistical Reasoning course.

Lab Research Paper. Preparation and submission of an *Animal Behaviour*-format manuscript as would be submitted for publication of a study in a peer-reviewed journal, following standard scientific paper layout including abstract, introduction, methods, results, discussion, acknowledgements, and references cited sections. Appropriate statistical analyses and effective verbal and visual presentation of results are required, important components. Data from one of the six in-lab experiments this year (optional inclusion of data from previous years) will be written up as if the students (working in groups of 3 or 4) had performed an original study and were submitting it to a journal for publication consideration. As is common with real scientific submissions, a cycle of original submission, followed by revision based on reviewers' comments (in this case the instructor), and resubmission will be involved. My hope is that, upon submission of the second, revised draft, you will have demonstrated that you have mastered the process of preparing the ultimate product of scientific research, the peer-reviewed journal article, having produced a manuscript that you will be proud to show to peers or graduate admissions committees as an example of the high-quality work you are capable of.

Zoo Project Proposal. Working in groups of 3 or 4, students will prepare a brief proposal of an observational study to be conducted over a 3-week period at Omaha's Henry Doorly Zoo. The proposal will specifically address all the components of a research project previously discussed in the "mini-lectures" in lab, including possible statistical tests based on the nature of data anticipated to be collected.

Zoo Project Oral Presentation. Each group will make a 15-minute oral presentation in the "Zoo Research Colloquium" the last week of the semester. Each student in the group is required to participate in the oral presentation. This Colloquium will be structured in the same way as an oral presentation section at a regular scientific meeting, giving students experience of that common manner of communicating research findings in science.

Zoo Project Paper. Each group will prepare an *Animal Behaviour*-format manuscript of their Zoo project, in the same manner as the Research Report described above, including the same components. This assignment comprises the required "final exam" component of the course.

LATE ASSIGNMENTS POLICY:

Assignments will be accepted past the due date for up to one week, but with a deduction of 10% per weekday (maximum deduction is therefore equal to 50% of the possible points). To discuss extenuating circumstances that justify exceptions to this general policy, students should meet with the instructor, if possible.

STATEMENT ON ACADEMIC HONESTY:

Students in BIO/EVS 372 are expected to adhere to both the letter and the spirit of the Creighton University policy on academic honesty as described in the Undergraduate Bulletin and the Student Handbook. The College of Arts and Sciences policy and procedures may be found at <https://www2.creighton.edu/fileadmin/user/CCAS/docs/acadhonesty.html>. In keeping with Creighton University's values and the scientific community's insistence on honesty and respect for each scholar's work, any suspicion of academic dishonesty will be taken very seriously and investigated vigorously. **Any breach of academic honesty on any assignment in this class will result in an automatic score of zero for the assignment in question.** If you have questions about the appropriateness of any action, please consult the instructor.

CLASS CANCELLATION PROCEDURE:

Should the campus be closed due to inclement weather, class is cancelled. If the instructor is unable to meet the class, students will be notified, if at all possible, by an email from the class' BlueLine site. In the unlikely event that such notification is not possible, cancellation will be announced at the beginning of class by a Biology Department Staff or Faculty person (and no one else).

DISABILITY SERVICES:

Disability Services at Creighton University is committed to providing services and resources to meet the need of qualified students with disabilities by establishing equal access to academic programs and University facilities. Students with a documented disability who wish to request academic accommodations in a particular class are encouraged to contact Disability Services as soon as possible to discuss the request process and eligibility requirements, as accommodations are not retroactive. If you believe that you may qualify or have questions regarding accommodations, please visit the [Disability Services Website](#) for more information or contact Disability Services at DisabilityServices@creighton.edu or 402-280-2195.

Once accommodations are granted from Disability Services, students are responsible for informing their professors of approved academic accommodations. Accommodation letters are generated and shared via ClockWork, an accommodation software system.

MODE OF DELIVERY - INSTRUCTOR'S DESCRIPTION:

In this course, laboratory sessions will meet in RS 307 at the regularly scheduled times, with all students in a section present simultaneously. A "mini-lecture" that traditionally had been given in person at the beginning of the lab period will this semester be pre-recorded and available to students prior to the week's lab time. The weekly quizzes in the first half of the semester will be given in lab, with coverage as described by the instructor via BlueLine communication at the beginning of that week. It is anticipated that students will rarely if ever need to be present in RS 307 for more than two hours. At the end of the semester, the Zoo Research Colloquium will be held in person in a room to be announced (subject to change to Zoom format if circumstances necessitate).

CLASSROOM SAFETY REQUIREMENTS:

When in the laboratory classroom, students (and instructors) must wear masks at all times, as well as gloves and protective eyewear (usually appropriate goggles). When in the lab, appropriate social distancing will be maintained. When travelling off campus in University Shuttles, appropriate COVID-19 safety procedures will be required at all times. When at field sites or the Henry Doorly Zoo, appropriate COVID-19 safety procedures as required by Creighton University or the Zoo will be followed at all times.

SYLLABUS STATEMENT FROM PROVOST (REQUIRED IN ALL CLASSES):

Creighton University may modify, suspend, or postpone any and all activities and services immediately and without notice because of *force majeure* causes beyond Creighton's control and occurring without its fault or negligence including, but not limited to, acts of God, fire, war, governmental action, terrorism, epidemic, pandemic, weather, national emergencies, or other threats to the safety of students or staff. Creighton

may, at its option, alter the academic schedule or provide alternate instruction modalities to meet course objectives and competencies and program outcomes, including, but not limited to, distance or remote learning, until such time as Creighton determines normal operations may resume safely.

Instructor's Addition: In the event of a disruption of normal classroom activities due to emergencies such as a switch to all-remote learning caused by a disease outbreak, the format for this course will be modified to enable completion of the course. In that event, you will be provided an addendum to this syllabus that will supersede this version.

COVID-19 POLICY STATEMENTS FROM THE COLLEGE OF ARTS & SCIENCES:

Attendance Language for Coronavirus Circumstances:

Students are required to attend all face-to-face classes to which they are assigned if healthy. Students who miss a class because of an emergency (non-health related) are expected to notify their instructor as soon as possible. *If you are sick, please do not come to class.* Even if you can't attend class, you won't fall behind. Students who must miss class for a protracted period of time (or even just a day) due to illness or self-quarantining due to COVID-19 exposure will be able to engage the course material online.

Classroom Recording Language for Academic Misconduct

Learning takes place in the face to face and virtual classrooms through a variety of means, including lectures, discussions, activities, etc. For learning to take place, these environments need to be a safe space. As part of that safe space, we should speak respectfully to and with each other. That is not to suggest that any of us will never misspeak. To learn from these conversations, we need to ensure that what happens in our face to face and virtual classrooms stays in the classroom.

For this reason, *all* course materials, including handouts, problem sets (and solutions), and lecture and discussion materials (PowerPoint slides, videos, lecture and discussion recordings, etc.) that are posted on the course BlueLine site are considered to be copyrighted and are intended to be used only by students enrolled in that class, for the purposes of fulfilling the course objectives. Only the instructor may record common class sessions. Only the instructor may distribute any and all recorded materials, including individual student discussion posts. Sharing any of these materials with others outside of the course will be considered "misuse of academic resources," as defined in the *Creighton University Student Handbook* as an act of academic misconduct, and students can be penalized, up to and including failure of the course.

In the case of recorded live lecture and discussion material, students should be aware that recording may continue during class breaks. Therefore, private conversations should be held elsewhere in order to avoid inadvertent recording.

There are additional consequences for cyberbullying or otherwise using a recording in violation of our code of conduct or Title IX policies.

University Requirements for Student Technology

There are university tech standards for students, and you can view these at <https://www.creighton.edu/node/170088>.

Statement about Assigned Course Time

Please hold the assigned course time as sacrosanct, so that synchronous remote delivery is always possible should it become necessary. The instructor recognizes that there may be the need to record course meetings for students who cannot attend, even remotely, in real time.

Background Environments Visible During Zoom Use

While you zoom, your background is visible unless you choose a virtual background. Take care that there is nothing in your background that would compromise your privacy concerns. Please remove distractions and remind roommates/family of your schedule.

Recording Delays

Recordings of classroom content may not be available in real time, as sometimes it takes up to 24 hours for classroom recordings to become available.