Chair: Tracy Christofero | **GC#6: Course Addition**

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. ***The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.***

College: Science | Dept/Division: Biological | Alpha Designator/Number: BSC 644 | (•) Graded ( ) CR/NC

Contact Person: Jayme Waldron | Phone: 304-696-3361

NEW COURSE DATA:

New Course Title: Quantitative Ecology

Alpha Designator/Number: 644

Title Abbreviation: Quantitative Ecology

(Limit of 25 characters and spaces)

Course Catalog Description: (Limit of 30 words)
An introduction to statistical analyses using presence absence, mark-recapture, and count data to estimate population parameters, such as occupancy and survival.

Co-requisite(s):

First Term to be Offered: Fall 2017

Prerequisite(s): Graduate Student

Credit Hours: 3

Course(s) being deleted in place of this addition (*must submit course deletion form*):

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head	Date 15 MARCH 2017
Registrar Sonja A G	Date 3-15-17
College Curriculum Chair	Date 3-31-17
Graduate Council Chair	Date

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College: Science | Department/Division: Biological Sciences | Alpha Designator/Number: 644

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Jayme Waldron

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "***Not Applicable***" if not applicable.

Not Applicable

3. REQUIRED COURSE: If this course will be required by another deparment(s), identify it/them by name. Enter "***Not Applicable***" if not applicable.

Not applicable

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "***Not Applicable***" if not applicable.

Not applicable

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "***Not Applicable***" if not applicable.

Not applicable

6. COURSE OBJECTIVES: (May be submitted as a separate document)

1) Provide graduate students with a review of basic statistics for ecological analyses (e.g., t-test, ANOVA, linear regression, ANCOVA)
2) Introduce graduate students to data analyses for ecological presence-absence data.
3) Introduce graduate students to data analyses for ecological count data.
4) Introduce graduate students to data analyses for mark-recapture data.

7. COURSE OUTLINE (May be submitted as a separate document)

The course will provide a review of statistical analyses (t-tests, ANOVA, linear regression, linear regression, ANCOVA, logistic regression, Possion and Negative Binomial Regression), will introduce students to analyses for presence absence data (e.g., occupancy modeling), and will introduce to students to mark-recapture data (using program MARK).

Course introduction, Data & Distributions, measures of central Tendencies & dispersion, Hypothesis development
One and two sample t-tests
ANOVA
Introduction to General Linear Models, Linear Regression,
ANCOVA
Introduction to Generalized Linear Models, logistic Regression,
Poisson & Negative Binomial Regression
Introduction to occupancy modeling & Principles of statistical inference
Introduction to program Presence and single season, single species occupancy models
Occupancy: Application and Design
Introduction to mark-recapture
Introduction to program MARK, data formatting
Wildlife survival analysis in MARK
Known fates analysis in MARK

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

Occupancy Estimation and Modeling (2006) by Mackenzie et al. (Eds.), Elsevier
*Additional Study Aids: Extra readings will be assigned.

Peer-reviewed manuscripts from high-impact journals

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

Lecture.

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10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

Homework, Exams, Final Exam (cumulative), classroom discussions of peer-reviewed manuscripts that demonstrate use of statistical analyses.

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

See attached syllabus

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Please insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:
Course Number and Title:
Catalog Description:
Prerequisites:
First Term Offered:
Credit Hours:

Department: Biological Sciences
Course Number and Title: BSC 644, Quantitative Ecology
Catalog Description: An introduction to statistical analyses using presence absence, mark-recapture, and count data to estimate population parameters, such as occupancy and survival.
Prerequisites: Must be a graduate student
First Term Offered: Fall 2017
Credit Hours: 3

COURSE SYLLABUS OUTLINE

Course Title and Number: Special Topics: Quantitative Ecology (BSC 644)
Semester and Year: Fall 2017
Lecture: xxx

Instructor:
Name: Dr. Jayme L. Waldron
Office: S-378
Office Hours: xxx
Office Phone: 696-3361
Email: waldron3@marshall.edu

Office Hours: I make every effort to keep scheduled office hours. Please be aware that sometimes there are conflicts with required meetings, and I cannot be present. When possible, I will make announcements on muOnline if I am unable to make scheduled office hours. I strongly encourage you to make an appointment if you need to meet with me.

Course Description: Studies of free-ranging animal populations regularly involve collection of binary data (e.g., presence/absence, or "where?") and/or count data (e.g., how many?). The goal of this course is to introduce students how to design and implement field-based studies of wildlife populations. Specifically, students will learn how to use presence/absence, mark-recapture, and count data to estimate survival probability and occupancy. Furthermore, students will learn how to use count data to derive estimates of abundance. Upon completing this course, students will be able to develop hypotheses about wildlife populations and analyze data sets from field studies.

Credit: 3 hours in Biological Sciences
Prerequisites: Graduate Student

University Policies: By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802

Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

Text Information:
Required Text:

1) Occupancy Estimation and Modeling (2006) by Mackenzie et al. (Eds.), Elsevier
2) MARK, A Gentle Introduction: http://www.phidot.org/software/mark/downloads/index.html

*Additional Study Aids: Extra readings will be assigned:

Bailey, L. L, et al. 2004. Estimating site occupancy and species detection probability parameters for terrestrial salamanders. Ecological Applications 14(3):692-702.

Engqvist, L. 2005. The mistreatment of covariate interaction terms in linear model analyses of

behavioural and evolutionary ecology studies. Animal Behaviour 70:967-971.
MacKenzie, D. I. et al. 2002. Estimating site occupancy rates when detection probabilities are less than one. Ecology 83(8):2248-2255.

***Computer Requirements:** Microsoft Word, Excel, SAS, and internet. Students will be required to download free software:

1. program Presence: http://www.mbr-pwrc.usgs.gov/software/presence.html
2. program MARK: http://www.phidot.org/software/mark/download/

Desired Learner Outcomes/Objectives:

(1) Understand how to develop hypotheses about wildlife populations.
(2) Understand and interpret basic summary statistics.
(3) Learn how to design basic wildlife population studies.
(4) Acquire skills necessary to estimate survival and occupancy probability.

Expected-learning-outcomes-rubric: how learning outcomes will be practiced and assessed.

Student Learning Outcomes	How students will practice each outcome	How student achievement of each outcome will be assessed
Understand how to develop hypotheses about wildlife populations	Reading assignments Homework Exams	1) Effective classroom discourse will depend on completion of reading assignments. Students must effectively relate reading assignments to lecture and classroom discussions. Students will be assessed based on their ability to use reading material in their homework assignments, and their knowledge of lecture and reading materials on exams. 2) I will evaluate homework using criteria outlined handouts.
Understand and interpret basic summary statistics	Reading assignments Lecture Homework	1) Students will be evaluated based on their performance (accuracy) on homework assignments and exams. Homework criteria will be outlined in handouts.
Learn how to design basic wildlife population studies	Homework Lecture Exams	1) I will evaluate the students' ability to complete homework assignments correctly and on time. 2) I will evaluate the accuracy of lecture exam questions. 3) Students will be assessed based on their willingness to participate (e.g., ask questions and answer questions) in discussions
Acquire skills necessary to estimate survival and occupancy probability.	Homework Lecture Exams	1) I will evaluate the students' ability to complete homework assignments correctly and on time. 2) I will evaluate the accuracy of lecture exam questions. 3) Students will be assessed based on their willingness to participate (e.g., ask questions and answer questions) in discussions

Grading Policy: Grading scale will be as follows:

90-100% = A 80-89% = B 70-79% = C 60-69% = D ≤ 59% = F

Exam 1	**20%**
Exam 2	**20%**
Exam 3	**20%**
Final Exam	**20%**
Homework	**20%**

Homework

Homework assignments will be assigned during class and given a minimum of one week to complete. When assignments are not turned in on time, a letter grade will be deducted on the assignment for every day the assignment is late.

Lecture Exams

There will be three take-home exams and a take-home, cumulative final. Exam dates on the syllabus may change, but exams will be announced at least one week in advance. Exams will include questions from lectures AND reading assignments. Students will be given one week to complete each exam. **All exams are expected to be taken as scheduled**. Make-up exams will not be given without an excuse from the university.

Participation: Attendance is MANDATORY. You will have to sign-in during every class period. Please consult the university policy on excessive absences (see link at beginning of syllabus). You can miss three classes (i.e., 10% of lectures). After the third absence, 3% will be deducted from your final grade for EVERY missed class.

Cell phones/texting: Mobile phones are not permitted in class. You will be dismissed from class if you are caught texting or if your phone rings. You will be given an absence for the day.

Laptops/ipads/notebooks/etc: I recommend that students bring computers to class; however, computers can ONLY be used when I indicate that it is appropriate (e.g., during modeling exercises). Notes must be taken using paper and writing utensils.

COURSE OUTLINE/DAILY/WEEKLY SCHEDULE:

Week (Dates)	Topic	Reading
Week 1 (Aug 21-25)	1) Course Introduction 2) Data & distributions 3) Measures of central tendencies and dispersion	
Week 2 (Aug 28-Sep1)	1) Hypothesis Development 2) One and two sample t-tests	
Week 3 (Sep 4-8)	1) ANOVA Labor Day Holiday	
Week 4 (Sep 11-15)	1) Introduction to General Linear Models 2) Linear Regression **EXAM 1**	
Week 5 (Sep 18-22)	1) Introduction to Generalized Linear Models 2) ANCOVA	Engqvist (2005)
Week 6 (Sep 25-29)	1) Logistic Regression 2) Poisson and Negative Binomial Regression (counts)	
Week 7 (Oct 2-6)	1) Introduction to Occupancy **Exam 2**	Chapters 1 & 2
Week 8 (Oct 9-13)	1) Principles of statistical inference 2) Program Presence	Chapter 3 Exercises 1-2 MacKenzie et al. (2002)
Week 9 (Oct 16-20)	1) Single-season, single-species occupancy models	Chapters 4 & 5 Exercise 3
Week 10 (Oct 23-27)	1) Application & Design	Chapter 6 Exercises 4-5, 9 Bailey et al. (2004)
Week 10 (Oct30-Nov3)	1) MARK introduction **Exam 3**	MARK book
Week 11 (Nov 6-10)	1) MARK formatting	MARK book
Week 12 (Nov 13-17)	2) Survival and assumptions	MARK book
Week 13 (Nov 20-24)	Thanksgiving Break	MARK book
Week 14 (Nov27-Dec1)	3) Known fates (telemetry)	MARK book
Week 15 (Dec6-10)	4) Other MARK applications	MARK book
FINAL (Dec11-15)	**Final Exam**	