Spring 2-1-2023

WILD 571.00: Estimation of Demographic Parameters

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WILD 571 – Estimating Demographic Parameters from Marked Animals
Spring Semester 2023
Instructor: Dr. Daniel Walsh

Suggested Readings (read before class each day)
- Gentle Introduction to Mark – online, chapters noted in brackets below []
  http://www.phidot.org/software/mark/docs/book/
- Bayesian Population Analysis Using WinBUGS (Kery and Schaub 2012) chapters noted in curly braces below {}
- Primary literature as assigned

Optional More Advanced Reading
- Bringing Bayesian Models to Life (Hooten and Hefley 2019)
- Bayesian Data Analysis 3 (Gelman et al.)
- Hierarchical Modeling and Inference in Ecology: The Analysis of Data from Populations, Metapopulations and Communities (Royle and Dorazio)

Class meeting times:
Lectures: MW 12:00-1:20pm JRH 205,
Lab: W 2-3:50pm JRH 205

Office Hours (NS 205):
> Location: NS205
> Mon. 1:30 - 2:30PM
> Wed. 1:30 - 2:00 PM
> or by appointment

Tentative Schedule of Topics

January	18	Introduction, Sampling
	23	Maximum Likelihood Estimation [Ch. 1], Burnham et al. (1987), "Design and analysis methods for fish survival experiments based on release-Recapture". p. 2-25.
	25	Live-resight models (Cormack-Jolly-Seber) [chp 1,2,3]
	Lab	Sampling, optimization and likelihood
	30	Live-resight models (Cormack-Jolly-Seber) Lebreton et al. (1992)
February	1	Bayesian Inference / Fitting models with MCMC {Ch. 1, 2, 3}
	Lab	European dippers
	6	Bayesian Inference / Fitting models with MCMC {Ch. 1, 2, 3}
	8	Bayesian Inference / CJS {Ch. 7}

	Lab	MCMC in R and NIMBLE
	13	Bayesian Inference / Occupancy models {Ch. 13}
	15	[Data storage, formatting and manipulation](#) (link to RStudio Webinar)
	Lab	MCMC in R and NIMBLE, Markdown
	20	**President's Day**
	22	Bayesian Inference / Model diagnostics
	Lab	Analysis review
	27	Bayesian Inference / Count Data models {Ch. 13}
March	1	**Exam 1**
March	6	Incorporating Scientific Questions / Including Covariates [Ch. 6]
	8	Model selection
	Lab	Hen clams, covariates
	13	Closed-population models [Ch. 14] {Ch. 6} Otis et al. (1978)
	15	Time-to-event Models
	Lab	Hares, Taxicabs
	20	**Spring Break**
	22	**Spring Break**
	27	Time-to-event Models
	29	Inference to unmarked populations
	Lab	Example in R
April	3	Spatial capture-recapture
	5	**Exam 2**
	10	Robust design models [Ch. 15] Kendall et al. (1997)
	12	Multi-State Models as a Unifying Theory of Mark-Recapture. [Ch. 10], {Ch. 9}, Lebreton & Pradel (2002), Dhondt (2002)
	Lab	Regularization in NIMBLE
	17	Spatial Occupancy Models
	19	Spatial Occupancy Models
	Lab	Review
	24	Systems thinking – bringing the pieces together
	26	**Student presentations**

Lab   Spawning suckers

May   1   **Student presentations**
           3   **Student presentations**

Grading: All exams will be take-home exams.   Exams will be handed out at the end of class on a Wednesday and will be due the following Monday at the beginning of class. Students are to work independently on exams and may not discuss the exams with anyone else. Email the completed exam (html, Rmd, word, and any other code) to daniel.walsh@umontana.edu prior to the deadline.

Final Presentation: Each student must analyze a data set relevant to course topics of their choice (to be approved by the instructor). Students then must present their analysis and results as an oral scientific presentation. All analyses should be original. More details on the depth and structure of the analyses will be given in class. To be fair to all presenters and to maximize learning, students must attend all presentations. Ten points will be deducted from a student's own presentation for each presentation missed without an approved absence.

A short (5-10 minute) quiz will be given prior to class every Wednesday. Quizzes are intended to keep students focused on technical analysis details. Quizzes will be posted to Moodle on Tuesdays and students must email their quizzes to daniel.walsh@umontana.edu prior to the start of class (12:00) on Wednesdays.

Computer lab exercises will not be graded. Students are encouraged to work together on the labs. If you do not understand a lab, please ask for help because the concepts will likely be on an exam.

Exam 1   25%
Exam 2   25%
Presentation 25%
Quizzes   20%
Participation 5%

PARTICIPATION: Out of respect for your fellow classmates and the instructor, it is expected that every student will attend and actively participates during each of the lectures, labs and student presentations. Unexcused absences, disrespect to classmates or the instructor, lack of active engagement or having a cell phone on, displayed or used during class will negatively impact the participation grade.

PLAGARISM:
Plagiarism will not be tolerated and will result in failing the course.

DROP DATES:

After registering and through the **first seven (7) instructional days of the semester**, students may use [Cyberbear](#) add courses or change sections and credits; through the **first fifteen (15) instructional days of the semester**, students may use [Cyberbear](#) to drop courses. Fees are reassessed on the sixteenth day of the term. Added courses and credits may result in additional fees. For courses dropped by the fifteenth instructional day, no fees are charged and courses are not recorded. (For deadlines and refund policy for withdrawal from all courses, see the Withdrawal sections of this catalog.)

An instructor may specify that drop/add is not allowed on the internet. A drop/add form is used to make changes in these courses, if approved by the instructor.

After adding a course, the credit/no credit grading option or auditor status may be elected on the internet or on a form available at the Registration Counter in Griz Central in the Lommasson Center. These options are not allowed for some courses as identified in the Class Schedule. Change of grading option to audit is not allowed after the 15 instructional day.

Beginning the sixteenth (16) instructional day of the semester through the forty-fifth (45) instructional day, students use paper forms to drop, add and make changes of section, grading option, or credit. The drop/add form must be signed by the instructor of the course and the student's advisor. The signed drop/add form must be returned to the Registration Counter (or the Registrar's Office at Missoula College) no later than the **forty-fifth** instructional day. A $10.00 processing fee is charged for each drop/add form. Added courses and credits may result in additional fees. There are no refunds or reductions of fees for courses dropped and grades of W (withdrew) are recorded.

Beginning the forty-sixth (46) instructional day of the semester through the last day of instruction before scheduled final examinations, students must petition to drop. The petition form must be signed by the instructor of the course and the student's advisor and, the dean of the student's major. A $10.00 processing fee is charged for each petition. There are no refunds or reductions of fees for courses dropped, and the instructor assigns a grade of WP (withdrew/passing) if the student's course work has been passing or a WF (withdrew/failing) if the course work has been failing. These grades do not affect grade averages but they are recorded on students' transcripts.

Documented justification is required for dropping courses by petition. Some examples of documented circumstances that may merit approval are: accident or illness, family emergency, or other circumstances beyond the student's control.

The opportunity to drop a course for the current term for such a course ends on the last day of instruction before scheduled final exams. Dropping a course taken in a previous term or altering grading option or audit status for such a course is not allowed. The only exceptions are for students who have received a grade of NF (never attended).

ElevateU:

The Wildlife Program is committed to the career success of our students and encourages you to participate in ElevateU – UM's signature career readiness program – to ensure that you graduate career-ready, with the education, skills, and tools needed to launch, carry-on, and

pivot your post-graduation career. Participation in ElevateU is free and can be started at any time, no matter where you are in your academic or career journey.

Get started by creating a profile on Handshake (https://umt.joinhandshake.com/) to search for jobs and internships or by scheduling an appointment with an Experiential Learning and Career Success (ELCS; https://www.umt.edu/experiential-learning-career-success/default.php) career coach or advisor.