

Estimating Demographic Parameters from Marked Animals

Autumn Semester 2016

Instructor: Dr. Paul M. Lukacs

Required Readings (read before class each day)

- Gentle Introduction to Mark – online, chapters noted in brackets below []
- [A Gentle Introduction - online](#)
- Primary literature as assigned

Class meeting times:

TR 9:30-10:50 GBB 202, T 12-1:50 STON 106

August	30	Introduction, Sampling
September	1	Maximum Likelihood Estimation [Ch. 1], Burnham et al. (1987), p. 2-25.
	Lab	Sampling, optimization and likelihood
	6	Dead recovery models (band recoveries) [Ch. 2, 3, 8]
	8	Live-resight models (Cormack-Jolly-Seber) Lebreton et al. (1992)
	Lab	European dippers, sage grouse
	13	Bayesian Inference / Fitting models with MCMC
	15	Bayesian Inference / Fitting models with MCMC
	Lab	MCMC in R and JAGS
	20	Incorporating Scientific Questions / Including Covariates [Ch. 6]
	22	Role of model selection in Science. Burnham & Anderson (2001)
	Lab	Hen clams
	27	Closed-population models [Ch. 14] Otis et al. (1978)
	29	Closed-population models Robust Design models / Exam 1
	Lab	Analysis review
October	4	Robust Design models [Ch. 15] Kendall et al. (1997)
	6	Robust Design models
	Lab	Hares, Taxicabs, Goldeneye
	11	Joint Live-Dead Models [Ch. 9] Burnham (1993), Barker (1997)
	13	Joint Live-Dead Models [Ch. 9] Burnham (1993), Barker (1997)
	Lab	
	18	TWS
	20	TWS
	Lab	

	25	Variance estimation, derived parameters,
	27	Delta method, Profile likelihoods, bootstrapping [App B]
	Lab	Example in R
November	1	Random Effects and Variance Components
	3	Random Effects and Variance Components
	Lab	Review
	8	Election day
	10	Multi-State Models as a Unifying Theory of Mark-Recapture. [Ch. 10], Lebreton & Pradel (2002), Dhondt (2002)
	Lab	
	15	Movement and State Change. Doligez et al. (2002)
	17	Modeling transitions, what are the limits to complexity?
	Lab	Spawning suckers
	22	Thanksgiving Hazard rate / Cox models
	24	Known fate discrete time survival modeling [Ch. 16]
	Lab	Black ducks
December	29	Discussion
	1	Thanksgiving – no class/lab
	6	Student presentations
	8	Student presentations
	20	Student presentations (10:10-12:00)

Grading: All exams will be take-home exams. Exams will be handed out at the end of class on a Thursday and will be due the following Tuesday at the beginning of class. Students are to work independently on exams and may not discuss the exams with anyone else.

Final Presentation: Each student must analyze a capture-recapture data set 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 for each presentation missed without an approved absence.

A short (5-10 minute) quiz will be given at the start of class every Tuesday. Quizzes are intended to keep students focused on technical analysis details.

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	25%

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).