Population Dynamics and Estimation (FiW 4414) CRN 84182

M/W 2:30 pm – 3:45 pm 317 Cheatham Fall 2017

Instructor:
Dr. Marcella J. Kelly
146 Cheatham Hall
(540) 231-1734
makelly2@vt.edu
Office hours: 4-5:30pm M/W

Graduate Student Teaching Assistants

Christian Osorio
318 Cheatham
(540) 577-6641
ctosorio@vt.edu
Office hours: 8-10am M/W

Zach Martin
349 Latham
(910) 232-3154
zpmartin@vt.edu
Office hrs: 11am–1pm M/W

Undergrad Tutors/Teaching Assistants:
Miranda Anderson (miraja8@vt.edu); John Connock (cjohn4@vt.edu); Emily Schlake (eschlake@vt.edu); Sam Wilson (samw14@vt.edu)

Required Textbooks (Available at the VT Bookstore and Volume II)

Mills, L. S. 2013. Conservation of wildlife populations: Demography, genetics and management. Blackwell Publishing, Massachusetts. ISBN: 978-0-470-67149-8

I will post sections of the 2 books (below) on Canvas as required/optional reading:

Akçakaya, H.R.; Burgman, M.A.; and L.R. Ginzburg. 1999. Applied population ecology: principles and computer exercises using RAMAS EcoLab. Second edition. Sinauer Associates, Inc.; Sunderland Massachusetts.

Gotelli, N.J. 2001. A primer of ecology. 4th Edition. Sinauer Associates, Inc. Sunderland, Massachusetts

This class will cover:

Estimation of population sizes and demographic parameters for wildlife and fish populations. Population growth, structure, and regulation. Population models in discrete and continuous time for harvested, non-harvested, and small populations. Age/stage structured populations, Leslie matrices, life tables, survivorship curves, metapopulations, population viability analysis, and genetic considerations in population dynamics, basic population genetics.

Rules of Conduct:

- Students are expected to attend all scheduled lectures. If you miss a lecture do not ask the instructor for class notes. It is your responsibility to obtain any materials that may have been distributed during your absence (e.g., handouts, assignments).

- You will still be held responsible for submitting assignments that were due on the date of your absence. Students will not be awarded full credit for any assignments turned in late in cases of unexcused absence. You also will be expected to complete and submit any work or assignments announced during your absence on or before the normal expected due date.

- If you know that you have a conflict at the time an exam is scheduled, you must make arrangements with the instructor in advance to take that exam **early**. If you miss an exam without a valid excuse (for example, a serious medical or family situation... the validity of which will be determined by the instructor), you **will not be allowed** to make up that exam and will receive a grade of 0. If you know that you will be unable to attend class on a date when an assignment is due, you may submit the assignment early or meet with the instructor to make advanced preparations. Otherwise, full credit will not be awarded.

- If you have a disability for which counseling or assistance is being obtained through the Dean of Students Office, you must provide written documentation of such consultation and a statement that details any special needs or conditions to the instructor by the end of the first week of class.

- The University Honor Code will be strictly enforced in this course. Work submitted in your name must be your own and should reflect only your effort, including those assignments involving computer work. All assignments that you submit shall be considered for grading unless otherwise noted. Thus, all aspects of your coursework are covered by the Honor System. Any suspected violations of the Honor Code will be reported promptly to the Honor Court System. Honesty in academic work will develop professional integrity. The faculty and your fellow students at Virginia Tech will not tolerate any form of academic dishonesty.

- If you have questions about the materials covered in lectures, or readings, do not hesitate to ask. Help the instructor recognize that something may not be completely clear by *asking questions*.

Evaluation of Student Performance (i.e. grading)

	Points	Percentage	
Exam 1	100	17.39%	34.8%
Exam 2	100	17.39%	
Problem set 1	45	7.8%	40.76%
Problem set 2	45	7.8%	
Problem set 3	45	7.8%	
Problem set 4	45	7.8%	
Problem set 5	55	9.56%	
Final Exam:	135	23.68%	
Total Points =	570	100%	

The following grading scale will be used and *may* be lowered by the curve if necessary:

A	>92.5%
A-	89.5 – 92.4%
B+	87 – 89.4%
B	83 – 86.9%
B-	79.5 – 82.9%
C+	77 – 79.4%
C	73 – 76.9%
C-	69.5 – 72.9%
D+	67 – 69.4%
D	63 – 66.9%
D-	59.5 – 62.9%
F	<59.5%

NOTE: I will make use of the course homepage on the VT **Canvas** system to post announcements, assignments, course documents, clarifications, etc. It is your responsibility to check this website regularly to obtain this information.

DISABILITY STATEMENT: Any student who feels that s/he may need an accommodation because of a disability (learning disability, attention deficit disorder, psychological, physical, etc.), please see the instructor.

Dates	Topics	Assignments due	Readings
Aug 28 & 30	Introduction; course mechanics; definition of population ecology; begin estimation techniques (quadrat and line transect methods)		Mills 2013:Chap.1 (all) and Chap. 4 pps. 54-59, plus handouts provided with sample problems. Buckland et al. 2001. DISTANCE estimation reading on Canvas
Sept 4 (Holiday-no class) & 6th	Continue estimation techniques: mark-recapture (Lincoln-Peterson, Schnabel, Regression, Cormack-Jolly-Seber)		Mills 2013: Chap.4 pps. 60 -64 & 79-87. Handouts provided with sample problems.
Sept 11 & 13	Population growth (exponential); discrete versus continuous	Problem Set 1 due Wed. Sept. 13 Submit at beginning of class	Mills 2013: Chap.5 pps. 79-84. Gotelli 2001: Chap. 1 pps. 2-14 and 20-22; (Optional: Akcakaya et al. 1999: Chap 1 pages 1-27).
Sept 18 & 20	Population growth (logistic); discrete vs. continuous*; r* vs. K selection		Mills 2013: Chap.7 (all). Gotelli 2001: Chap. 2 pps. 26-37 and 41-45. Begon et al. 2000 pages 177-181 (pdf provided on Canvas)
Sept 25 & 27	Age and stage-structured populations; Leslie Matrix; Lefkovitch matrix; intro to sensitivity analysis	Problem Set 2 due Wed. Sept. 27 Submit at beginning of class	Mills 2013: Chap.6 pps.98-116.Akcakaya et al. 1999: Chap.4 pps. 105 -123 and Chap.5 pps. 157-163 and 168-171. (optional: Gotelli 2001: Chap. 3 pps. 61- 79.)
Oct 2 & 4	Life tables: static vs. dynamic; survivorship curves	First Exam Wed. Oct. 4	Akcakaya et al., 1999. Chap.4 pps. 127-133; Gotelli 2001: Chap.3 pps. 52-61
Oct 9 & 11	Metapopulations, Start competition.		Mills 2013: Chap.10 pps.175-185 and pps. 188-198. Gotelli Chap.4 pps. 82-96 & Chap. 7. (Optional Akcakaya et al.,1999. Chap. 6 pps. 183-203).
Oct 16 & 18	Competition and predation models	Problem Set 3 due Wed. Oct. 18 Submit at beginning of class	Mills 2013: Chap.8 (all). Gotelli 2001: Chap.5 pps. 100-117; Chap.6 pps. 126 -140.
Oct 23 & 25	Harvested populations maximum sustained yield; fixed quota vs. fixed effort; catch per unit effort.		Mills 2013: Chap. 14 (all). Plus handouts and readings provided from Krebs 2001 and King 1995
Oct 30 & Nov 1	Yield per recruit; stock recruitment; optimal yield; Beverton-Holt Stock recruitment models	Problem Set 4 due Wed. Nov 1 Submit at beginning of class	
Nov 6 & 8	Dave Steffen: yield curves; comp vs. add mort. Uncertainty and variation;		Mills 2013: Chap.5 pps. 84 -97. Chap.11 pps. 201 -206; Chap 12 (all). (Optional Akcakaya et al. 1999: Chap.2 pps.34 -61 and Chap.4 pps.123-127
Nov 13 & 15	Population viability analysis: demographic environmental stochasticity; PVA with multiple populations Simulation models:	Second Exam Wed. Nov. 15	Mills 2013: Chap 12 (cont.). (Optional Akcakaya et al 1999. Chap. 7 pages 213 – 234)
Nov 20 & 22	Fall Break – Happy Thanksgiving!	Eat some turkey or tofurky	Catch – up!
Nov 27 & 29	Population genetics: review terms and measurements of diversity/variation		Mills 2013: Chap 9 pps.154-162. Plus handouts provided from Hallerman 2003; Frankham et al. 2002 on Canvas.
Dec 4 & 6	Effective population size; Inbreeding coefficient and theory of inbreeding; outbreeding depression; Evolutionary significant units (ESUs).		Mills 2013: Chap 9 pps. 162-174 and Frankham et al. 2002. Chapter 11 and Chapter 12 posted on Canvas
Dec 11 & 13	Genetic markers; genetic tools, applied uses of genetic approaches; course wrap-up.	Problem Set 5 due Mon. Dec 11 Submit at beginning of class	Mills 2013: Chap. 3 (all) and Chapter 10 pps. 177 -185
DECEMBER 16	**SATURDAY**	**FINAL EXAM – 3:25-5:25pm**	