



**BIO 403/603: Restoration Ecology
Fall 2016 Syllabus**

Course description: The science and practice of repairing ecosystems that have been damaged or destroyed; including determining reference conditions, restoration practices across biomes, and challenges to restoration during an era of global change in climate, disturbance, and biological invasions.

Credits: 3

Lecture meeting time/location: Friday, 8:30-11:15am, CBC C133

Course overview: breadth and depth in the science of restoration ecology and the practice of ecological restoration, including assessment of reference conditions, manipulating ecological change, conducting experiments and treatments to accomplish restoration objectives, monitoring restoration effectiveness, and uncertainties in restoration during an era of global change in climate, disturbance, and biological invasions. The course will include traditional textbook material, as well as emphasizing primary literature and critiquing outcomes of published and ongoing real-world restoration projects.

WebCampus: the course uses WebCampus for posting course materials such as the syllabus, lectures, readings, and study guides. WebCampus is accessible from the main UNLV webpage. ***For questions, please email the instructor through the standard UNLV email.***

Student Rebelmail email account: Please keep your Rebelmail account active (it ends with @unlv.nevada.edu) as this will be the formal means of written communication to students for this course per UNLV policy.

Structure and approach: this course will combine traditional lectures based on the textbook and supplemented with material from other research and project examples from the primary literature, and student-led learning such as presentations of research from the primary literature. This is an upper level course; as such, students are particularly encouraged to raise questions and stimulate discussion on restoration topics during class.

Course objectives: this course is intended to provide perspective on the potential and limitations of restoration as a technique for studying biological systems and conserving ecosystem services, introduce examples of restoration projects through a global perspective, and facilitate an advanced understanding of synthesizing results of restoration projects and communicating the results of projects to diverse audiences.

Learning outcomes: By the end of the course, students should have knowledge of the theoretical and practical basis for developing research projects to address uncertainties in the restoration ecology literature and for developing real-world restoration projects that address the Society for Ecological Restoration's (SER) standards for restoration projects. Specifically, students should be able to

formulate research plans for uncertainties associated with nine SER criteria of "restored" ecosystems and to identify monitoring and research strategies to assess if those criteria have been met.

At the completion of this course, students should demonstrate a good understanding of:

1. Why restoration is needed and when it may or may not be appropriate
2. Uncertainties, challenges, uses and need of/for reference conditions
3. How restoration techniques are developed and how to assess their effectiveness
4. How restoration can be used to test ecological theory, such as successional theory
5. Why particular restoration projects were implemented and their outcomes
6. Identify strengths and weaknesses in scientific papers in the restoration literature
7. Familiarity with restoration journals and the primary literature
8. How climate change may or may not influence restoration
9. The role of biological invasions in restoration
10. Appreciation for the diversity of approaches to restoration.

Textbook required (freely available online via UNLV library):

Clewell, A.F., and J. Aronson. 2013. Ecological restoration: principles, values, and structure of an emerging profession. Island Press, Washington, D.C. 303 pp.

Society for Ecological Restoration Policy Document (required reading, available online)

[SER] Society for Ecological Restoration International Science and Policy Working Group. 2004. The SER international primer on ecological restoration. Society for Ecological Restoration International, Tucson, AZ. 13 pp. (see foundation docs - <http://www.ser.org/resources>)

Optional books:

Abella, S.R. 2015. Conserving America's National Parks. CreateSpace, Charleston, SC. 200 pp. (While UNLV encourages faculty to pursue writing books and using them for educational purposes, this book is strictly optional, and any examples pulled from it will be made available in class. Available at <https://sites.google.com/site/conservingnationalparks/>)

A short guide to writing about biology, Jan A. Pechenik (any of the editions are fine, with older editions being cheaper)

Listing of other textbooks, for your information, that may be useful (some better than others, some online UNLV), and that are NOT required reading except where we may use portions of chapters that will be specifically noted in class during the semester:

Allison, S.K. 2014. Ecological restoration and environmental change. Routledge, New York. 245 pp.

Apfelbaum, S.I. 2008. Nature's second chance: restoring the ecology of Stone Prairie Farm. Beacon Press, Boston, MA.

Apfelbaum, S.I., and A. Haney. 2010. Restoring ecological health to your land. Island Press, Washington, D.C. 240 pp.

Apostol, D., and M. Sinclair (eds.). 2006. Restoring the Pacific Northwest. Island Press, Washington, D.C. 475 pp.

Aronson, J., S.J. Milton, and J.N. Blignaut. 2007. Restoring natural capital: science, business, and practice. Island Press, Washington, D.C. 400 pp.

Bainbridge, D.A. 2007. A guide for desert and dryland restoration. Island Press, Washington, D.C. 391 pp.

- Bradshaw, A.D., and M.J. Chadwick. 1980. *The restoration of land*. University of California Press, Berkeley. 317 pp.
- Cabin, R.J. 2011. *Intelligent tinkering: bridging the gap between science and practice*. Island Press, Washington, D.C.
- Clewell, A.F., and J. Aronson. 2013. *Ecological restoration: principles, values, and structure of an emerging profession*. Island Press, Washington, D.C. 303 pp.
- Cole, D.N., and L. Yung (eds.). 2010. *Beyond naturalness: rethinking park and wilderness stewardship in an era of rapid change*. Island Press, Washington, D.C. 287 pp.
- Doyle, M., and C.A. Crew (eds.). 2008. *Large-scale ecosystem restoration: five case histories from the United States*. Island Press, Washington, D.C.
- Falk, D.A., M.A. Palmer, and J.B. Zedler (eds.). 2006. *Foundations of restoration ecology*. Island Press, Washington, D.C. 384 pp.
- Galatowitsch, S.M. 2012. *Ecological restoration*. Sinauer Associates, Inc.
- Greipsson, S. 2011. *Restoration ecology*. Jones and Barlett Learning, Sudbury, MA. 408 pp.
- Gunn, J.M. (ed.). 1995. *Restoration and recovery of an industrial region: progress in restoring the smelter-damaged landscape near Sudbury, Canada*. Springer-Verlag, New York. 358 pp.
- Hobbs, R.J., and K.N. Suding. 2009. *New models for ecosystem dynamics and restoration*. Island Press, Washington, D.C. 352 pp.
- Howell, E.A., J.A. Harrington, and S.B. Glass. 2012. *Introduction to restoration ecology*. Island Press, Washington, D.C. 418 pp.
- Jordan, W.R., M.E. Gilpin, and J.D. Aber (eds.). 1987. *Restoration ecology: a synthetic approach to ecological research*. Cambridge University Press, New York. 342 pp.
- Jordan, W.R., and G.M. Lubick. 2011. *Making nature whole: a history of ecological restoration*. Island Press, Washington, D.C. 256 pp.
- Mann, C.C. 2005. *1491: new revelations of the Americas before Columbus*. Vintage Books, New York. 541 pp.
- Mann, C.C. 2011. *1493. Uncovering the New World Columbus created*. Alfred A. Knopf, New York.
- Morrison, M.L. 2002. *Wildlife restoration: techniques for habitat analysis and animal monitoring*. Island Press, Washington, D.C. 209 pp.
- Packard, S., and C.F. Mutel. 1997. *The tallgrass restoration handbook*. Island Press, Washington, D.C. 463 pp.
- Riley, A.L. 1998. *Restoring streams in cities*. Island Press, Washington, D.C. 445 pp.
- Temperton, V.M., R.J. Hobbs, T. Nuttle, and S. Halle (eds.). 2004. *Assembly rules and restoration ecology*. Island Press, Washington, D.C. 439 pp.
- van Andel, J., and J. Aronson (eds.). 2012. *Restoration ecology: the new frontier*. Wiley-Blackwell, Oxford, United Kingdom. 381 pp.

Readings: readings from the primary literature and parts of books will be assigned throughout the semester; students are responsible for this content as it may appear on exams and is needed for class discussion. The readings will be discussed further in class and provided as citations or PDFs at the appropriate intervals (usually weekly) during the semester.

Missed lectures: no formal attendance at regular lectures will be taken, but material from lectures will appear on exams and attendance of lectures is expected. Furthermore, study guides and information about what material may appear on exams may or may not just be provided during lectures. For credit, writing assignments must be turned in during class, unless otherwise noted in class.

Class schedule: topics for the course and the schedule of topics/lectures and exams is below. The schedule is subject to change depending on progress during the semester. Changes to the schedule will be announced during class, and students are responsible for this information. The course schedule takes the approach of covering key topics in restoration (such as succession, pollination ecology, and fire ecology) with examples from particular ecosystems (e.g., western frequent-fire forests) infused throughout. Each weekly topic can be considered a stand-alone independent topic, but integrated with other material throughout the semester.

<u>Date</u> ¹	<u>Topics</u>
Sept 2	Introduction, overview of restoration, restoring pest-damaged forests
Sept 9	Succession theory and restoration; restoring Midwestern prairie-savannas
Sept 16	Soil in restoration; restoring biological soil crusts (<i>Lindsay Chiquoine, UNLV, guest speaker</i>)
Sept 23	Fire ecology and restoration, including reference conditions and landscape context; restoring frequent-fire western forests
Sept 30	Pollination ecology and restoring pollinator habitat; ecosystem invasibility and exotic species as problems in restoration; QUIZ 10:30-11:15am
Oct 7	Revisiting reference conditions, what to restore in a changing climate; restoration goals; restoring Chihuahuan Desert grasslands and other examples of reference condition uncertainty
Oct 14	MID-TERM EXAM 8:30-9:45; Hydrological restoration (wetlands, streams, and lakes), including marquee restoration projects in U.S. national parks
Oct 21	Assessing outcomes of the diverse restoration activities across U.S. national parks including wildlife restoration, rare plants, forests, fires, and cultural landscapes
Nov 4	Restoring habitat for rare wildlife species (<i>relict leopard frogs, Jef Jaeger, UNLV, guest speaker</i>); restoring structure and function of Mojave Desert ecosystems
Nov 18	Restoration Forum: question and answer session with panel of restoration practitioners with the National Park Service, BLM, SWCA consultants, and other agencies
Dec 2	Urban ecology and restoring urban habitats; wrap up topics, prepare for final exam and graduate student presentations and undergraduate restoration forum reports
Dec 9	Graduate student presentations with undergraduate student question and answer session; WRITING ASSIGNMENTS DUE for 403 and 603 by end of class
Dec 16	Final exam scheduled 8:30am – 10:30am – note, this may or may not be a take-home or other format, and details will be given in class.

¹Holidays

Oct 28 Nevada Day

Nov 11 Veterans Day

Nov 25 Thanksgiving

Optional Events (see <https://sites.google.com/site/conservingnationalparks/>)

Sept 14, 2016, 7:30-9pm, Conserving America's National Parks during an Era of Global Change talk by Scott Abella at the UNLV University Forum, Barrick Museum

Oct 1, 2016, 2:00-4:00pm, National Park Centennial Talk and Q/A at the Jewel Box Theater, Clark County Library (Maryland/Flamingo)

Oct 5, 2016 time to be determined, Conserving America's National Parks, Master Gardener's Talk, at the University of Nevada Cooperative Extension, 8050 Paradise Road, Las Vegas

Nov 9-11, 2016, SER Southwest Chapter Annual Conference – at Las Vegas Springs Preserve! See Register-Students-Scholarships. <http://sersw2016.wixsite.com/conference>

Grading:

Quiz (Sept 30): 20 points
Mid-term exam (Oct 14): 100 points
Final exam (Dec 16): 100 points (note: this may/may not be take-home exam; details in class)
BIO 403 assignment (Dec 9): 30 points (BIO 403 only)
BIO 603 assignment (Dec 9): 30 points (BIO 603 only)

Total points for the course: 250 points

Grading will follow a standard scale where $\geq 90-100\% = A$, $\geq 80-89.9\% = B$, $\geq 70-79.9\% = C$, $\geq 60-69.9\% = D$, and $< 60\% = F$. Chromatic variants (+ and -) may or may not be used, but if used, they will be applied to the student's benefit. Students should not assume that a curve will be applied to the course grading, but if one is applied, it will be a minor adjustment to the student's benefit.

Lecture Quizzes and Exams: the course will have a mid-term and final exam; both exams may consist of a mixture of multiple choice, true false, matching, short answer, and short essay. The final exam will emphasize material since the mid-term, but may be cumulative. The course will have one quiz, before the mid-term, to provide an early status assessment and provide students with a feel for the type of questions on the exam. Exams and the quiz will cover lecture material and readings, and may require integration of material in lecture with readings.

Missed exams and quiz: missed exams follow standard UNLV policies including for religious holidays (see UNLV policy below), official extracurricular activities, and medical reasons, and where make-up exams are subject to the procedures and timing restrictions as outlined in the official UNLV policy. If a make-up exam is administered, it may necessarily be in a different format than the one students will take/have taken in class. If there are known conflicts with dates of the quiz or exams for a university-approved absence or medical release, please see the instructor early in the semester or at least 2 weeks before the schedule quiz/exam. Provide original, written documentation obtained from proper authorities (e.g., physician). If there is an emergency on the day of an exam (e.g., medical emergency, car accident), notify the instructor as soon as possible and provide original documentation on official letterhead (e.g., signed documentation by a physician or legal authority) justifying an absence. A make-up exam may then be administered. Falsifying absences and documents will result in a zero for the exam and may trigger more severe academic misconduct as determined by the university. Please be on time for all class periods out of respect, and especially so on exam days. Exams may not be passed out to students who arrive more than 15 minutes after the scheduled start of the exam and they will not be passed out after the first exam has been handed in. There will be a set time duration for taking exams, and students arriving late will not receive extra time. Be on time and these potential problems will be avoided. Unexcused absence from an exam will result in a zero.

BIO 403 Writing Assignment

-Due Dec 9, in class by end of class, unless otherwise noted in class.

-Prepare at least four questions for restoration practitioners prior to the Nov 18 Restoration Forum. These questions do not need to be turned in before the Nov 18 forum, but considerable thought should go into asking good questions.

-The assignment is to prepare a synthesis and assessment of the Nov 18 Restoration Forum. The synthesis can take the form of providing an overview and assessment of the overall forum (e.g., what are the knowledge gaps, compare and contrast different perspectives of the practitioners or compare and contrast the practitioner perspectives with those reported in the published restoration literature), or, students can choose to synthesize particular topics that may be covered in depth based on the forum (e.g., Succession? Climate change? Reference conditions? We do not yet know what questions students will ask or what the practitioners will discuss).

-The synthesis and assessment is to be no more than six single-spaced pages with 1-inch margins and Times New Roman 12 point font of TEXT.

-If graphs, tables, or reference lists are included, these do not count toward the six-page limit.

-As an appendix, include the list of at least four questions you developed for the practitioners. This appendix does not count toward the six-page limit either.

-A grading rubric, criteria, and other details will be provided in class.

BIO 603 Writing Assignment and Presentation

-Due Dec 9, in class by end of class, unless otherwise noted in class.

-Select one of the following four topics:

- 1) resolving controversial ecological responses of Yellowstone wolf restoration
- 2) evaluating benefits and tradeoffs of Colorado River restoration in the Grand Canyon
- 3) assessing effectiveness of Sequoia National Park fuels and fire restoration program
- 4) determining the effectiveness in restoration of using treatments derived from traditional ecological knowledge (e.g., performance of culturally important plants, water-harvesting techniques, planting practices, etc.)

-Prepare a maximum of a 15-page, single-spaced manuscript (page limit includes everything – text, any tables/figures, and references list – if more space is needed for additional supplemental figures/tables, these items can be placed in a supplemental appendix which does not count toward the 15-page limit). The font should be 12 point Times New Roman and 1 inch margins.

-The manuscript should follow standard format of title, author name, abstract, introduction, methods (in this case, reporting on how literature was obtained or any additional information), and then a results and discussion section (these can be kept separate or combined for our purposes here) followed by an implications for practice section. The general formatting of the text and references should follow guidelines for the journal Restoration Ecology (find instructions online), which also gives specifications for the implications for practice section. Only deviate from the RE instructions to meet the specifications above of having the manuscript single-spaced; include continuous line numbers throughout the manuscript as is done for submission of a real manuscript.

-As long as the goal of your chosen topic (either 1, 2, 3, or 4 above) is covered, how you approach doing that and the specifics you may decide to focus on are up to you. Your grade will be based on how effectively you accomplish what you have set out to do in your paper, which is based on your introduction section and stated objectives at the end of the introduction.

-A grading rubric, criteria, and other details will be provided in class.

-The presentation, to be delivered in person in class on Dec 9, is anticipated to be approximately 10 minutes, or 8-10 slides, providing a conference-style summary of the written paper. Further instructions will be provided in class. Photos of sites, being careful to ensure credit is given or using public domain photos also with credits, would be good additions along with tables, figures, and presentation text on slides.

The literature that should be evaluated for #1 includes:

- Barber-Meyer, S.M. 2015. Trophic cascades from wolves to grizzly bears or changing abundance of bears and alternative foods? *Journal of Animal Ecology* 84:647-651.
- Barber-Meyer, S.M., L.D. Mech, and P.J. White. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. *Wildlife Monographs* 169:1-30.
- Baril, L.M., A.J. Hansen, R. Renkin, and R. Lawrence. 2011. Songbird response to increased willow (*Salix* spp.) growth in Yellowstone's northern range. *Ecological Applications* 21:2283-2296.
- Berger, J., P.B. Stacey, L. Bellis, and M.P. Johnson. 2001. A mammalian predator-prey imbalance: grizzly bear and wolf extinction affect avian neotropical migrants. *Ecological Applications* 11:947-960.
- Berger, K.M., E.M. Gese, and J. Berger. 2008. Indirect effects and traditional trophic cascades: a test involving wolves, coyotes, and pronghorn. *Ecology* 89:818-828.
- Beschta, R.L. 2005. Reduced cottonwood recruitment following extirpation of wolves in Yellowstone's northern range. *Ecology* 86:391-403.
- Beschta, R.L., and W.J. Ripple. 2006. River channel dynamics following extirpation of wolves in northwestern Yellowstone National Park, USA. *Earth Surface Processes and Landforms* 31:1525-1539.
- Beschta, R.L., and W.J. Ripple. 2007. Increased willow heights along northern Yellowstone's BlackTail Deer Creek following wolf reintroduction. *Western North American Naturalist* 67:613-617.
- Beschta, R.L., and W.J. Ripple. 2010. Recovering riparian plant communities with wolves in northern Yellowstone, U.S.A. *Restoration Ecology* 18:380-389.
- Beschta, R.L., and W.J. Ripple. 2012. Berry-producing shrub characteristics following wolf reintroduction in Yellowstone National Park. *Forest Ecology and Management* 276:132-138.
- Beschta, R.L., and W.J. Ripple. 2012. The role of large predators in maintaining riparian plant communities and river morphology. *Geomorphology* 157/158:88-98.
- Beschta, R.L., and W.J. Ripple. 2013. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade: comment. *Ecology* 94:1420-1425.
- Beschta, R.L., and W.J. Ripple. 2015. Divergent patterns of riparian cottonwood recovery after the return of wolves in Yellowstone, USA. *Ecohydrology* 8:58-66.
- Beschta, R.L., and W.J. Ripple. 2016. Riparian vegetation recovery in Yellowstone: the first two decades after wolf reintroduction. *Biological Conservation* 198:93-103.
- Beschta, R.L., C. Eisenberg, J.W. Laundré, W.J. Ripple, and T.P. Rooney. 2014. Predation risk, elk, and aspen: comment. *Ecology* 95:2669-2671.
- Beschta, R.L., L.E. Painter, T. Levi, and W.J. Ripple. 2016. Long-term aspen dynamics, trophic cascades, and climate in northern Yellowstone National Park. *Canadian Journal of Forest Research* 46:548-556.
- Beyer, H.L., E.H. Merrill, N. Varley, and M.S. Boyce. 2007. Willow on Yellowstone's northern range: evidence for a trophic cascade? *Ecological Applications* 17:1563-1571.
- Bilyeu, M., D.J. Cooper, and N.T. Hobbs. 2008. Water tables constrain height recovery on Yellowstone's northern range. *Ecological Applications* 18:80-92.
- Cassidy, K.A., D.R. MacNulty, D.R. Stahler, D.W. Smith, and L.D. Mech. 2015. Group composition effects on aggressive interpack interactions of gray wolves in Yellowstone National Park. *Behavioral Ecology* 26:1352-1360.
- Creel, S., and D. Christianson. 2009. Wolf presence and increased willow consumption by Yellowstone elk: implications for trophic cascades. *Ecology* 90:2454-2466.

- Eberhardt, L.L., P.J. White, R.A. Garrott, and D.B. Houston. 2007. A seventy-year history of trends in Yellowstone's northern elk herd. *Journal of Wildlife Management* 71:594-602.
- Fritts, S.H., E.E. Bangs, J.A. Fontaine, M.R. Johnson, M.K. Phillips, E.D. Koch, and J.R. Gunson. 1997. Planning and implementing a reintroduction of wolves to Yellowstone National Park and central Idaho. *Restoration Ecology* 5:7-27.
- Halofsky, J.S., W.J. Ripple, and R.L. Beschta. 2008. Recoupling fire and aspen recruitment after wolf reintroduction in Yellowstone National Park, USA. *Forest Ecology and Management* 256:1004-1008.
- Kauffman, M.J., J.F. Brodie, and E.S. Jules. 2010. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade. *Ecology* 91:2742-2755. (see two erratum, *Ecology* 92:1384, and *Ecology* 94:1432)
- Kauffman, M.J., J.F. Brodie, and E.S. Jules. 2013. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade: reply. *Ecology* 94:1425-1431. (but see errata for their 2010 article this pertains to).
- Kauffman, M.J., N. Varley, D.W. Smith, D.R. Stahler, D.R. MacNulty, and M.S. Boyce. 2007. Landscape heterogeneity shapes predation in a newly restored predator-prey system. *Ecology Letters* 10:690-700.
- Laundré, J.W., L. Hernández, and K.B. Altendorf. 2001. Wolves, elk, and bison: reestablishing the landscape of fear in Yellowstone National Park USA. *Canadian Journal of Zoology* 79:1401-1409.
- Laundré, J.W., L. Hernández, and W.J. Ripple. 2010. The landscape of fear: ecological implications of being afraid. *Open Ecology Journal* 3:1-7.
- Mao, J.S., M.S. Boyce, D.W. Smith, F.J. Singer, D.J. Vales, J.M. Vore, and E.H. Merrill. 2005. Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park. *Journal of Wildlife Management* 69:1691-1707.
- Marshall, K.N., D.J. Cooper, and N.T. Hobbs. 2014. Interactions among herbivory, climate, topography and plant age shape riparian willow dynamics in northern Yellowstone National Park, USA. *Journal of Ecology* 102:667-677.
- Marshall, K.N., N.T. Hobbs, and D.J. Cooper. 2013. Stream hydrology limits recovery of riparian ecosystems after wolf reintroduction. *Proceedings of the Royal Society B* 280:article20122977.
- Middleton, A.D., M.J. Kauffman, D.E. McWhirter, J.G. Cook, R.C. Cook, A.A. Nelson, M.D. Jimenez, and R.W. Klaver. 2013. Animal migration amid shifting patterns of phenology and predation: lessons from a Yellowstone elk herd. *Ecology* 94:1245-1256.
- Nelson, A.A., M.J. Kauffman, A.D. Middleton, M.D. Jimenez, D.E. McWhirter, J. Barber, and K. Gerow. 2012. Elk migration patterns and human activity influence wolf habitat use in the greater Yellowstone ecosystem. *Ecological Applications* 22:2293-2307.
- Painter, L.E., and W.J. Ripple. 2012. Effects of bison on willow and cottonwood in northern Yellowstone National Park. *Forest Ecology and Management* 264:150-158.
- Painter, L.E., R.L. Beschta, E.J. Larsen, and W.J. Ripple. 2014. After long-term decline, are aspen recovering in northern Yellowstone? *Forest Ecology and Management* 329:108-117.
- Painter, L.E., R.L. Beschta, E.J. Larsen, and W.J. Ripple. 2015. Recovering aspen follow changing elk dynamics in Yellowstone: evidence of a trophic cascade? *Ecology* 96:252-263.
- Ripple W.J., and R.L. Beschta. 2003. Wolf reintroduction, predation risk, and cottonwood recovery in Yellowstone National Park. *Forest Ecology and Management* 184:299-313.
- Ripple, W.J., and E.J. Larson. 2000. Historic aspen recruitment, elk, and wolves in northern Yellowstone National Park, USA. *Biological Conservation* 95:361-370.

- Ripple, W.J., and R.L. Beschta. 2004. Wolves and the ecology of fear: can predation risk structure systems? *BioScience* 54:755-766.
- Ripple, W.J., and R.L. Beschta. 2004. Wolves, elk, willows, and trophic cascades in the upper Gallatin Range of southwestern Montana, USA. *Forest Ecology and Management* 200:161-181.
- Ripple, W.J., and R.L. Beschta. 2006. Linking wolves to willows via risk-sensitive foraging by ungulates in the northern Yellowstone ecosystem. *Forest Ecology and Management* 230:96-106.
- Ripple, W.J., and R.L. Beschta. 2012. Trophic cascades in Yellowstone: the first 15 years after wolf reintroduction. *Biological Conservation* 145:205-213.
- Ripple, W.J., E.J. Larsen, R.A. Renkin, and D.W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's northern range. *Biological Conservation* 102:227-234.
- Ripple, W.J., L.E. Painter, R.L. Beschta, and C.C. Gates. 2010. Wolves, elk, bison, and secondary trophic cascades in Yellowstone National Park. *Open Ecology Journal* 3:31-37.
- Ripple, W.J., R.L. Beschta, and L.E. Painter. 2015. Trophic cascades from wolves to alders in Yellowstone. *Forest Ecology and Management* 354:254-260.
- Ripple, W.J., R.L. Beschta, J.K. Fortin, and C.T. Robbins. 2014. Trophic cascades from wolves to grizzly bears in Yellowstone. *Journal of Animal Ecology* 83:223-233.
- Ripple, W.J., R.L. Beschta, J.K. Fortin, and C.T. Robbins. 2015. Wolves trigger a trophic cascade to berries as alternative food for grizzly bears. *Journal of Animal Ecology* 84:652-654.
- Romme, W.H., M.G. Turner, G.A. Tuskan, and R.A. Reed. 2005. Establishment, persistence, and growth of aspen (*Populus tremuloides*) seedlings in Yellowstone National Park. *Ecology* 86:404-418.
- Singer, F.J., L.C. Zeigenfuss, R.G. Gates, and D.T. Barnett. 1998. Elk, multiple factors, and persistence of willows in national parks. *Wildlife Society Bulletin* 26:419-428.
- Smith, D. W., R. O. Peterson and D. B. Houston. 2003. Yellowstone after wolves. *BioScience*. 53:330-340.
- Smith, D., D. Stahler, E. Stahler, M. Metz, K. Quimby, R. McIntyre, C. Ruhl, and M. McDevitt. 2014. Yellowstone National Park wolf project annual report 2013. National Park Service, Yellowstone Center for Resources, Mammoth Hot Springs, WY. 23 pp.
- Smith, D.W., L.D. Mech, M. Meagher, W.E. Clark, R. Jaffe, M.K. Phillips, and J.A. Mack. 2000. Wolf-bison interactions in Yellowstone National Park. *Journal of Mammalogy* 81:1128-1135.
- Smith, D.W., T.D. Drummer, K.M. Murphy, D.S. Guernsey, and S.B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.
- Stahler, D.R., D.W. Smith, and D.S. Guernsey. 2006. Foraging and feeding ecology of the gray wolf (*Canis lupus*): lessons from Yellowstone National Park, Wyoming, USA. *Journal of Nutrition* 136(S):1923S-1926S.
- Tercek, M.T., R. Stottlemeyer, and R. Renkin. 2010. Bottom-up factors influencing riparian willow recovery in Yellowstone National Park. *Western North American Naturalist* 70:387-399.
- Vucetich, J., D.W. Smith, and D.R. Stahler. 2005. Influence of harvest, climate, and wolf predation on Yellowstone elk 1961-2004. *Oikos* 111:259-270.
- White, P.J., K.M. Proffitt, and T.O. Lemke. 2012. Changes in elk distribution and group sizes after wolf restoration. *American Midland Naturalist* 167:174-187.
- Wilmers, C.C., and W.M. Getz. 2005. Gray wolves as climate change buffers in Yellowstone. *PLoS Biology* 3:571-576.

- Wilmers, C.C., D.R. Stahler, R.L. Crabtree, D.W. Smith, and W.M. Getz. 2003. Resource dispersion and consumer dominance: scavenging at wolf- and hunter-killed carcasses in greater Yellowstone, USA. *Ecology Letters* 6:996-1003.
- Winnie, J. 2014. Predation risk, elk, and aspen: reply. *Ecology* 95:2671-2674.
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The literature that should be evaluated for #2 includes at least:

- Belote, R.T., L.J. Makarick, M.J.C. Kearsley, and C.L. Lauer. 2010. Tamarisk removal in Grand Canyon National Park: changing the native-non-native relationship as a restoration goal. *Ecological Restoration* 28:449-459.
- Coggins, L.G., M.D. Yard, and W.E. Pine. 2011. Nonnative fish control in the Colorado River in Grand Canyon, Arizona: an effective program or serendipitous timing? *Transactions of the American Fisheries Society* 140:456-470.
- Cross, W.F., E.J. Rosi-Marshall, K.E. Behn, T.A. Kennedy, R.O. Hall, A.E. Fuller, and C.V. Baxter. 2010. Invasion and production of New Zealand mud snails in the Colorado River, Glen Canyon. *Biological Invasions* 12:3033-3043.
- Dodrill, M.J., C.B. Yackulic, B. Gerig, W.E. Pine, J. Korman, and C. Finch. 2015. Do management actions to restore rare habitat benefit native fish conservation? Distribution of juvenile native fish among shoreline habitats of the Colorado River. *River Research and Applications* 31:1203-1217.
- Gerig, B., M.J. Dodrill, and W.E. Pine. 2014. Habitat selection and movement of adult humpback chub in the Colorado River in Grand Canyon, Arizona, during an experimental steady flow release. *North American Journal of Fisheries Management* 34:39-48.
- Gloss, S.P., J.E. Lovich, and T.S. Melis (eds.). 2005. The state of the Colorado River ecosystem in Grand Canyon: a report of the Grand Canyon Monitoring and Research Center 1991-2004. Circular 1282. U.S. Geological Survey, Reston, VA. 220 pp.
- Hueffle, S.J., and L.E. Stevens. 2001. Experimental flooding effects on the limnology of Lake Powell Reservoir, southwestern USA. *Ecological Applications* 11:644-656.
- Kearsley, L.H., J.C. Schmidt, and K.D. Warren. 1994. Effects of Glen Canyon Dam on Colorado River sand deposits used as campsites in Grand Canyon National Park, USA. *Regulated Rivers: Research and Management* 9:137-149.
- Lovich, J., and T.S. Melis. 2007. The state of the Colorado River ecosystem in Grand Canyon: lessons from 10 years of adaptive ecosystem management. *International Journal of River Basin Management* 5:207-221.
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- Meretsky, V.J., D.L. Wegner, and L.E. Stevens. 2000. Balancing endangered species and ecosystems: a case study of adaptive management in Grand Canyon. *Environmental Management* 25:579-586.
- Mortenson, S.G., P.J. Weisberg, and B.E. Ralston. 2008. Do beavers promote the invasion of non-native *Tamarix* in the Grand Canyon riparian zone? *Wetlands* 28:666-675.

- Mortenson, S.G., P.J. Weisberg, and L.E. Stevens. 2012. The influence of floods and precipitation on *Tamarix* establishment in Grand Canyon, Arizona: consequences for flow regime restoration. *Biological Invasions* 14:1061-1076.
- Ralston, B.E. 2011. Summary report of responses of key resources to the 2000 low steady summer flow experiment, along the Colorado River downstream from Glen Canyon Dam, Arizona. Open-File Report 2011-1220. U.S. Geological Survey, Reston, VA. 129 pp.
- Ralston, B.E., P.A. Davis, R.M. Weber, and J.M. Rundall. 2008. A vegetation database for the Colorado River ecosystem from Glen Canyon Dam to the western boundary of Grand Canyon National Park, Arizona. Open-File Report 2008-1216. U.S. Geological Survey, Reston, VA. 37 pp.
- Sankey, J.B., B.E. Ralston, P.E. Grams, J.C. Schmidt, and L.E. Cagney. 2015. Riparian vegetation, Colorado River, and climate: five decades of spatiotemporal dynamics in the Grand Canyon with river regulation. *Journal of Geophysical Research: Biogeosciences* 120:1532-1547.
- Schmidt, J.C., R.H. Webb, R.A. Valdez, G.R. Marzolf, and L.E. Stevens. 1998. Science and values in river restoration in the Grand Canyon. *BioScience* 48:735-747.
- Stevens, L.E., and G. Siemion. 2012. Tamarisk reproductive phenology and Colorado River hydrography, southwestern USA. *Journal of the Arizona-Nevada Academy of Science* 44:46-58.
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- Stevens, L.E., T.J. Ayers, J.B. Bennett, K. Christensen, M.J.C. Kearsley, V.J. Meretsky, A.M. Phillips, R.A. Parnell, J. Spence, M.K. Sogge, A.E. Springer, and D.L. Wegner. 2001. Planned flooding and Colorado River riparian trade-offs downstream from Glen Canyon Dam, Arizona. *Ecological Applications* 11:701-710.
- Turner, R.M., and M.M. Karpiscak. 1980. Recent vegetation changes along the Colorado River between Glen Canyon Dam and Lake Mead, Arizona. Professional Paper 1132. U.S. Geological Survey, U.S. Government Printing Office, Washington, D.C. 125 pp.
- **Note: there may be additional papers, and if you find any, please let me know. Searching the reference lists of these papers plus running GoogleScholar may help uncover more.

The literature that should be evaluated for #3 includes at least:

- Caprio, A.C., and D.M. Graber. 2000. Returning fire to the mountains: can we successfully restore the ecological role of pre-Euroamerican fire regimes to the Sierra Nevada? Pp. 233-241 in Cole, D.N., S.F. McCool, W.T. Borrie, and J. O'Loughlin. *Wilderness science in a time of change conference – volume 5: wilderness ecosystems, threats, and management*. Proceedings RMRS-P-15-VOL-5. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Caprio, A.C., and P. Lineback. 2002. Pre-twentieth century fire history of Sequoia and Kings Canyon National Park: a review and evaluation of our knowledge. Pp. 180-199 in *Proceedings of the conference on fire in California ecosystems: integrating ecology, prevention, and management*. Association for Fire Ecology miscellaneous publication no. 1.
- Harvey, H.T., H.S. Shellhammer, and R.E. Stecker. 1980. Giant sequoia ecology. Scientific Monograph 12. National Park Service, U.S. Government Printing Office, Washington, D.C.

- Keeley, J.E., and T.W. McGinnis. 2007. Impact of prescribed fire and other factors on cheatgrass persistence in a Sierra Nevada ponderosa pine forest. *International Journal of Wildland Fire* 16:96-106.
- Keeley, J.E., D. Lubin, and C.J. Fotheringham. 2003. Fire and grazing impacts on plant diversity and alien plant invasions in the southern Sierra Nevada. *Ecological Applications* 13:1355-1374.
- Keifer, M. 1998. Fuel load and tree density changes following prescribed fire in the giant sequoia-mixed conifer forest: the first 14 years of fire effects monitoring. *Proceedings of the Tall Timbers Fire Ecology Conference* 20:306-309.
- Kilgore, B., and D. Taylor. 1979. Fire history of a sequoia-mixed conifer forest. *Ecology* 60:129-142.
- Kilgore, B.M. 1973. Impact of prescribed burning on a sequoia-mixed conifer forest. *Proceedings of the Annual Tall Timbers Fire Ecology Conference* 12:345-375.
- Kilgore, B.M. 1973. The ecological role of fire in Sierran conifer forests: its application to national park management. *Quaternary Research* 3:496-513.
- Kilgore, B.M., and G.S. Briggs. 1972. Restoring fire to high elevation forests in California. *Journal of Forestry* 70:266-271.
- Kilgore, B.M., and H.H. Biswell. 1971. Seedling germination following fire in a giant sequoia forest. *California Agriculture* 25:8-10.
- Kilgore, B.M., and R.W. Sando. 1975. Crown-fire potential in a sequoia forest after prescribed burning. *Forest Science* 21:83-87.
- Knapp, E.E., and J.E. Keeley. 2006. Heterogeneity in fire severity within early season and late season prescribed burns in a mixed-conifer forest. *International Journal of Wildland Fire* 15:37-45.
- Knapp, E.E., D.W. Schwilk, J.M. Kane, and J.E. Keeley. 2007. Role of burning season on initial understory vegetation response to prescribed fire in a mixed conifer forest. *Canadian Journal of Forest Research* 37:11-22.
- Knapp, E.E., J.E. Keeley, E.A. Ballenger, and T.J. Brennan. 2005. Fuel reduction and coarse woody debris dynamics with early season and late season prescribed fire in a Sierra Nevada mixed conifer forest. *Forest Ecology and Management* 208:383-397.
- Lambert, S., and T.J. Stohlgren. 1988. Giant sequoia mortality in burned and unburned stands: does prescribed burning significantly affect mortality rates? *Journal of Forestry* 86:44-46.
- Mutch, L.S., and D.J. Parsons. 1998. Mixed conifer forest mortality and establishment before and after prescribed fire in Sequoia National Park, California. *Forest Science* 44:341-355.
- Nesmith, J.C.B., A.C. Caprio, A.H. Pfaff, T.W. McGinnis, and J.E. Keeley. 2011. A comparison of effects from prescribed fires and wildfires managed for resource objectives in Sequoia and Kings Canyon National Parks. *Forest Ecology and Management* 261:1275-1282.
- Nesmith, J.C.B., A.J. Das, K.L. O'Hara, and P.J. van Mantgem. 2015. The influence of prefire tree growth and crown condition on postfire mortality of sugar pine following prescribed fire in Sequoia National Park. *Canadian Journal of Forest Research* 45:910-919.
- Parsons, D.J. 1995. Restoring fire to giant sequoia groves: what have we learned in 25 years? Pp. 256-258 in Brown, J.K., R.W. Mutch, C.W. Spoon, and R.H. Wakimoto (tech. coords.). *Proceedings: symposium on fire in wilderness and park management*. General Technical Report INT-GTR-320. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.
- Parsons, D.J. and S.H. DeBenedetti. 1979. Impact of fire suppression on a mixed-conifer forest. *Forest Ecology and Management* 2:21-33.
- Pitcher, D.C. 1987. Fire history and age structure in red fir forests of Sequoia National Park, California. *Canadian Journal of Forest Research* 17:582-587.

- Rocca, M.E. 2009. Fine-scale patchiness in fuel load can influence initial post-fire understory composition in a mixed conifer forest, Sequoia National Park, California. *Natural Areas Journal* 29:126-132.
- Roy, D.G., and J.L. Vankat. 1999. Reversal of human-induced vegetation changes in Sequoia National Park, California. *Canadian Journal of Forest Research* 29:399-412.
- Stephens, S.L., J.J. Moghaddas, C. Edminster, C.E. Fiedler, S. Haase, M. Harrington, J.E. Keeley, E.E. Knapp, J.D. McIver, K. Metlen, C.N. Skinner, and A. Youngblood. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western U.S. forests. *Ecological Applications* 19:305-320.
- Stephenson, N.L. 1999. Reference conditions for giant sequoia forest restoration: structure, process, and precision. *Ecological Applications* 9:1253-1265.
- Swetnam, T.W., C.H. Baisan, A.C. Caprio, P.M. Brown, R. Touchan, R.S. Anderson, and D.J. Hallett. 2009. Multi-millennial fire history of the giant forest, Sequoia National Park, California, USA. *Fire Ecology* 5:120-150.
- van Mantgem, P.J., N.L. Stephenson, and J.E. Keeley. 2006. Forest reproduction along a climatic gradient in the Sierra Nevada, California. *Forest Ecology and Management* 225:391-399.
- van Mantgem, P.J., N.L. Stephenson, E. Knapp, J. Battles, and J.E. Keeley. 2011. Long-term effects of prescribed fire on mixed conifer forest structure in the Sierra Nevada, California. *Forest Ecology and Management* 261:989-994
- van Mantgem, P.J., N.L. Stephenson, L.S. Mutch, V.G. Johnson, A.M. Esperanza, and D.J. Parsons. 2003. Growth rate predicts mortality of *Abies concolor* in both burned and unburned stands. *Canadian Journal of Forest Research* 33:1029-1038.
- van Mantgem, P.J., L.B. Lalemand, M. Keifer, and J.M. Kane. 2016. Duration of fuels reduction following prescribed fire in coniferous forests of U.S. national parks in California and the Colorado Plateau. *Forest Ecology and Management* 379:265-272.
- Van Mantgem, P.J., A.C. Caprio, N.L. Stephenson, and A.J. Das. 2016. Does prescribed fire promote resistance to drought in low elevation forests of the Sierra Nevada, California, USA? *Fire Ecology* 12:13-25.
- Vankat, J.L. 1977. Fire and man in Sequoia National Park. *Annals of the Association of American Geographers* 67:17-27.
- Webster, K.M., and C.B. Halpern. 2010. Long-term vegetation responses to reintroduction and repeated use of fire in mixed-conifer forests of the Sierra Nevada. *Ecosphere* 1(5):art9.
- York, R.A., J.J. Battles, A.K. Eschtruth, and F.G. Schurr. 2011. Giant sequoia (*Sequoiadendron giganteum*) regeneration in experimental canopy gaps. *Restoration Ecology* 19:14-23.
- **Supplemental info on area burned on Sequoia National Park website

Literature for #4 is a bit more open-ended, and will require performing new searches in GoogleScholar and related databases, plus taking advantage of references in books such as Bainbridge A guide for desert and dryland restoration, and papers such as the one below but that test effectiveness of the techniques:

Fowler, C.S. P. Esteves, G. Goad, B. Helmer, and K. Watterson. 2003. Caring for the trees: restoring Timbisha Shoshone land management practices in Death Valley National Park. *Ecological Restoration* 21:302-306.

Consider also searching info from places such as Walnut Canyon National Monument or Canyon de Chelly to identify practices and then seek out if they have been applied in restoration anywhere.

Instructor's Study Tips for Success

Below are some tips that work for ME; they may or may not work for you and it is useful to identify strategies that are effective for you.

-When I read a scientific paper, I start with the abstract, then often quickly examine the tables and figures, sometimes also skimming the article; I do often read entire articles, but if I have a pile of literature, usually I first do the abstract-figures-skim strategy on all articles, and then go back and read the most useful entirely. This can greatly increase efficiency and prevent getting bogged down.

-I have an extensive PDF library, but I don't do anything fancy for storage: I have folders (e.g., fire ecology) organized with different topics, I name the PDFs in a systematic way, and then I use built-in Windows key word searches to extract out PDFs, as needed, if I want to search within folders.

-I then have hundreds of pages of simple Word documents with the citations typed in (also searchable). I've never used citation databases to store my citations, but some people find such databases useful.

-In addition to my own files, GoogleScholar is my first go to for new literature searches, but it is not perfect and so it is important to use other search databases such as those offered by the UNLV library. It also is useful to scan the reference lists of articles I already have, which is an easy way to obtain relevant references. Consider also searching within specific journals, such as Restoration Ecology.

-I take notes on literature, either on paper or typing in notes in Word documents. Notes I take include useful ideas new to me, things I don't understand and wish to investigate further, or new citations to obtain, plus what seems to be consistent across papers or where there is uncertainty.

-Sometimes I also find it useful to search online for photographs of research sites papers may describe to give me a feel for what they are actually talking about.

-I personally need to study things multiple times for them to sink in, and sometimes using multiple methods. I still find taking notes, old-school on paper or typed in, to be useful. I also sometimes write short summaries of literature or particular topics because if you can write about something coherently often it means you do understand it. Consider also giving a Powerpoint to friends, or even just to yourself, because if you can explain things out loud, it also means you likely understand it.

-Things go better for me if I read assigned readings/study well in advance, giving me time to think about things, and then re-read again one or more times.

-In terms of sitting down to write, I usually fail if I'm not actually well prepared to write. What prepares me is having already done a thorough literature review and taken notes on the literature, maybe even having already constructed tables/figures to show the data/information I'm going to write about (that way you can tell the story from the tables/figures), and having at least a general outline of what I think is important and what the content will be. It can be difficult to write a scientific paper without an idea for where it is heading.

-I personally don't care for staring at a blank computer screen, so often I'll sketch out at least a rough draft of a paper on, well, paper, before transferring it to the computer. That is actually quite efficient because papers must be revised several times for quality, and the transfer to electronic serves as the first revision.

-My writing seems to improve if I am able to finish a draft of a paper (often already revised multiple times) and have at least several days to just let it sit, before returning to it to revise again.

-It is sometimes easier to be effective at something one is interested in and cares about; we have provided a diversity of topics to choose from for the writing assignments (including for 403 because there are a range of questions that can be focused on), so if it were me, I would choose topics I am most passionate about and wish to learn more about.

-These strategies work for me; I am not recommending them but rather recommending that students identify strategies that work for them.

Official UNLV and other course policies

Academic Misconduct—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

Copyright—The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)—The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor **within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses**, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching — The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:
<https://www.unlv.edu/provost/teachingandlearning>
<https://www.unlv.edu/provost/transparency>

Incomplete Grades—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the

instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring and Coaching— The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/> (**note from the instructor – take advantage of this resource!!! You might be pleasantly surprised!**)

Rebelmail — By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always **@unlv.nevada.edu**. **Emailing within WebCampus is acceptable.**

Library Resources — Students may consult with a librarian on research needs. For this class, the subject librarian is https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Final Examinations – The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

Other class-specific policies: Laptops and electronic devices for note taking are permitted so long as they are not cited as disruptive by other students. If other students or the instructor cite a particular device as disruptive, the device must be turned off. Disruptive talking during class is not allowed; disruptive students will have to be asked to leave to avoid compromising the experience of other students. This course is subject to overall UNLV policies governing academics at UNLV, available at the Office of the Executive Vice President and Provost: <https://www.unlv.edu/provost/policies-forms>. In addition, this course includes the policies below:

STUDENT CONDUCT AND POLICIES SPECIFIC TO EXAMS

Exam Policies –

- ✓ Students must show valid photo ID and correctly enter their NSHE number on score sheets.
- ✓ Students may be assigned specific seats.
- ✓ Students must bring a No. 2 pencil to record answers.
- ✓ No electronic devices are allowed during exams and must not be visible.
- ✓ All items such as bags, notes, or books must be placed underneath the desk seat during the exam.
- ✓ Students may not speak or read aloud during the exam, and eyes must not be covered.
- ✓ Student may not leave the room during the exam without consent of the instructor.
- ✓ Exams may not be distributed 15 minutes after the scheduled start of the exam and they will not be distributed after the first student has completed.
- ✓ Students must comply with any additional guidelines presented during the exam.
- ✓ Under all circumstances, the following situations will result in an incorrect answer: Entering the incorrect KEY ID (bubble; filling in more than one answer (bubble) for a particular question; erasure marks that obscure or make it difficult to determine the intended answer; blank answers.
- ✓ The scantron (answer sheet) and exam will not be returned, and are property of the School of Life Sciences.

Academic dishonesty or misconduct on exams or assignments and plagiarism in any form will result in a minimum zero score and expulsion from the course. See the Student Academic Misconduct Policy located at: <http://studentconduct.unlv.edu/misconduct/policy.html> Also, see the interesting article - http://www.chronicle.com/article/The-New-Cheating-Economy/237587?cid=wb&utm_source=wb&utm_medium=en&elqTrackId=c8c0f856b9d4a05950579497abac94e&elq=627dbc99ff044224ad32df05e67829cf&elqaid=10458&elqat=1&elqCampaignId=3924

No Audio or Visual Recording – Do not make any audio or visual recordings of the lectures or lecture material without the direct written permission of the instructor. If permission is granted, material is for a student's personal use only (i.e. not for further distribution) unless agreed upon with the instructor.

Drop Policy and Incomplete Grades – Should you decide that you cannot continue in the course, please take steps to officially drop through the Registrar's office, *do not just stop coming to class*. A grade of 'Incomplete' ('I') can be granted when a student has satisfactorily completed all course work up to the withdrawal date of that semester but for reason beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. A student who receives an Incomplete is responsible for making up whatever work was lacking at the end of the semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. See your instructor to request an Incomplete.