

Ecosystem Restoration Principles and Practice - FOR5157

1 Overview

Application of ecological theory and economic and political constraints to restoration practice. Emphasis on regional, national, and international case studies.

- 3 Credits
- Every Fall
- Format: 100% online, asynchronous
- <http://elearning.ufl.edu/>

Course Prerequisites: none

Instructor: Dr. Carrie Reinhardt Adams (Associate Professor, Environmental Horticulture)

- Please use the Canvas message/Inbox feature for fastest response, and please cc our TA when appropriate to increase chances you'll get a quick response.
- Office hours in person or virtual (Zoom) weekly on Wednesdays, 2-3pm and by appointment.
- Communication with the instructor: You can expect a response from a Canvas message within 24 hours on weekdays, 48 hours on weekends. I'm also happy to discuss any course issues over the phone, though I am less accessible that way (greenhouse experiments and field work often keep me from my desk!), and we may need to schedule a "phone appointment". For questions about the course in general and not related to your individual performance or course experience, please post your question to our Discussions.

Teaching Assistant: Felipe Veluk Gutierrez, PhD Candidate

- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email or phone by appointment.

Textbook(s) and/or readings: There is no required text for the course. Online readings will be provided for each learning topic. See section 5 below for specific readings.

2 Learning Outcomes

At the end of this course, each student will be able to:

- Describe theoretical and technical knowledge from ecology, soils and other bio-physical sciences that form the scientific foundation for ecological restoration.
- Discuss the social, economic and political constraints for ecological restoration practice.
- Analyze examples of restoration case studies from commonly restored and critical ecosystem types, along with the underlying principles and appropriate practice.

3 Course Logistics

This course is entirely web-based and students may access lectures, readings, and supporting materials as they become available each week.

Learning modules consisting of a lecture, readings, and supporting material, or a quiz are provided online for each topic. Learning modules build on previous modules so you should complete the learning modules in the order presented.

[Each learning module has required readings beyond the lecture. This information will be covered on quizzes and exams. These files will all be made available for you to view on your computer, save, or print. There may be references to additional (optional) readings and resources if you desire further investigation of a topic.]

Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A headset and/or microphone and speakers; a web cam is suggested.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. [What browser am I using?](#)

3.1 Assignments & Deliverables (see full descriptions in E-Learning)

3.1.1 Participate every content week in Weekly Discussion

Weekly Discussion provides an opportunity for students to interact and share ideas regarding material presented, and are an important part of class every content (non-quiz) week. These posts also give students an opportunity to think critically about the course material, and to share analysis and comprehension of the material with the instructor and classmates. Opportunity to post begins weekly on Monday evening/Tuesday morning and closes the following Monday at 10am. Examples of appropriate discussion posts include:

- Describing how the reading or lecture fits into the larger context of the course.
- Noting any critical definitions, further defining or clarifying terms if needed.
- Posing a test question related to the discussion that would be appropriate for an upcoming exam (multiple choice, essay, or short answer) and the correct answer; well thought-out question may actually appear on the exam.
- Drawing parallels and inference to your work or study
- Follow-up comments or questions on a fellow student's discussion post

Students are required to comment on the online discussion with at least one post each week. Posts must respond to the initial question posed or build on another peer's post. All posts should focus on class material, lecture or readings, but can be expanded to include personal experience or other helpful references. Limit initial posts to 50 words or less, follow up posts may be more lengthy.

You will be graded each week on your discussion posts—this constitutes 20% of your grade, and you will be provided with a grading rubric to further define expectations.

You will be assigned a small discussion group of peers that will participate together in each content week's Weekly Discussion.

3.1.2 Student Led Discussion Group assignment

Once per semester, each Discussion Group is required to create our weekly discussion question, which is then shared with all other students to guide discussion for the week. The randomly assigned leader for your group (designated with a "head" icon when you view your group in "People" under the "Discussion Groups" tab) is responsible for initiating group communication and a plan for completing the assignment. Responsibility for the rest of the assignment can be divided however the group sees fit.

To complete the assignment, submit summaries of all articles to be read, as well as a discussion question, by 10am on Monday of your assigned Module week. You will be graded as a group on your discussion question—this constitutes 10% of your grade; please see the grading rubric to further define expectations.

3.1.3 Quizzes

There will be four quizzes that cover basic concepts from the readings and lectures, and application and synthesis of course concepts, consisting of multiple choice, essay, and short-answer questions. Quizzes constitute 50% of your grade for the course. Look for class-authored exam questions from reading postings on the quizzes (see "Weekly Discussion" above) for a helpful review for quizzes. No additional content (readings, lectures, etc.) will be introduced on quiz weeks.

- Quiz 1: Week 4, due 9/19
- Quiz 2: Week 7, due 10/10
- Quiz 3: Week 11, due 11/7
- Quiz 4: Week 15, due 12/15

3.1.4 Principles 2 Practice (P2P) Assignment

Teaching a topic that you see as critical to applying restoration Principles to Practice will elevate your comprehension of course material and demonstrate your mastery of it. In consultation with the instructor, each student will choose a topic for a P2P Presentation. Preliminary topic choices should be submitted to the instructor during week 3 of the semester; after the instructors provide feedback to refine the topic choice, topics will be approved the following week, and presentations will be submitted in time to be viewed by the class during the last week of the course. A minimum of 5 relevant *journal articles* should be used in preparing your presentation.

The P2P assignment is broken into several components and is worth 20% of your grade.

- Preliminary topic submission: due 9/19
- Final topic and title: due 10/3
- Presentation: due 11/21

3.2 Grades & Grading Scale

50% Quizzes (12.5% each)

10% Group assignment: Leading Weekly Discussion

Grading Scale (%)

A 90-100
B+ 85-89.99
B 80-84.99
C+ 75-79.99
C 70-74.99
D+ 65-69.99
D 60-64.99
E < 60

20% Individual participation in Weekly Discussion

20% Principles 2 Practice (P2P) presentation

100% total

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

4 Course Content

The course is organized first as principles of ecological restoration and then introduced practices in ecological restoration. Course schedule may shift if needed.

WEEK	TOPIC
1	Course introduction, Principles of ecosystem restoration Part I Guiding Principles
2	Principles of ecosystem restoration Part II Ecological Principles
3	Principles of ecosystem restoration Part III and IV: Population/Communities/Ecosystems
4	Quiz 1
5	Principles V: Basic soils and biogeochemistry and Reference ecosystems
6	Practices: Wetlands
7	Quiz 2
8	Practices: Coasts and rivers
9	Practices: Revegetation (invasive species, seeding and planting)
10	Practices: Forests and Prescribed Fire
11	Quiz 3
12	Practices: Species reintroductions (animals, genetic considerations)
13	Work on P2P presentations
14	Restoration Planning
15	P2P Presentations by the class
16	Quiz 4

4.1 Readings

Readings are from the peer-reviewed literature and other sources. Potential readings include the following but may change with updates and substitutions as the course evolves.

Society for Ecological Restoration International Science and Policy Working Group. 2004. The SER International Primer on Ecological Restoration. www.ser.org

Funk, J.L. and S. McDaniel. 2010. Altering light availability to restore invaded forest: The predictive role of plant traits. *Restoration Ecology* 18 (6): 865-872.

Kelly, J., S. Jose, J. D. Nichols, M. Bristow. 2009. Growth and physiological response of six Australian rainforest tree species to a light gradient. *Forest Ecology and Management* 257:287-293.

O'Neill R.V. 2001. Is it time to bury the ecosystem concept? (With full military honors of course!). *Ecology* 82: 3275–3284

- Wong, T. M and T. Ticktin. 2015 Using population dynamics modelling to evaluate potential success of restoration: a case study of a Hawaiian vine in a changing climate. *Environmental Conservation* 42:20-30.
- Fontaine 2011. Improving our legacy: Incorporation of adaptive management into state wildlife action plans. *Journal of Environmental Management* 92:1403-1408.
- Hobbs, R. J., L. M. Hallett, P.R. Ehrlich, and H. A. Mooney. 2011. Intervention ecology: Applying ecological science in the twenty-first century. *Bioscience* 61:442-450.
- Jasper D.A. 2007. Beneficial Soil Microorganisms of the Jarrah Forest and Their Recovery in Bauxite Mine Restoration in Southwestern Australia. *Restoration Ecology* 15: S74 - S84
- Aronson, J., S. Dhillon, and E. LeFloch. 1995 On the need to select an ecosystem of reference, however imperfect. *Restoration Ecology* 3: 1-3.
- Aronson, M. F., and S. Galatowitsch. 2008. Long-term vegetation development of restored prairie pothole wetlands. *Wetlands*. 28: 883-895.
- Zedler, J. B., and J. C. Callaway. 1999. Tracking wetland restoration: Do mitigation sites follow desired trajectories? *Restoration Ecology* 7: 69-73.
- Collinge, S.K., C. Ray, and J.T. Marty. 2013. A long-term comparison of hydrology and plant community composition in constructed versus naturally occurring vernal pools. *Restoration Ecology* 21:704-712.
- Stainback, G.A., Lai, J.H., Pienaar, E.F., Adam, D.C., Wiederholt, R., Vorseth, C., 2020. Public preferences for ecological indicators used in Everglades restoration. *PLOS ONE* 15, e0234051. <https://doi.org/10.1371/journal.pone.0234051>
- Rood, S. B., G. M. Samuelson, J. H. Braatne, C. R. Gourley, F. M. R. Hughes, and J. M. Mahoney. 2005. Managing river flows to restore floodplain forests. *Frontiers in Ecology and the Environment* 3:193-201.
- Bernhardt, E.S., MA Palmer, JD Allan, G. Alexander, K. Barnas, S. Brooks, J. Carr, S. Clayton, C. Dahm, J. Follstad-Shah, D. Galat, S. Gloss, P. Goodwin, D. Hart, B. Hassett, R. Jenkinson, S. Katz, G. M. Kondolf, PS Lake, R. Lave, JL Meyer, TK O'Donnell, L. Pagano, B. Powell, E. Sudduth. 2009. Synthesizing US River Restoration Efforts. *Science* 208:636-637.
- Dent, D. H., S. J. DeWalt, and J. S. Denslow. 2013. Secondary forests of central Panama increase in similarity to old-growth forest over time in shade tolerance but not species composition. *Journal of Vegetation Science* 24:530-542.
- Bayraktarov, E., Saunders, M.I., Abdullah, S., Mills, M., Beher, J., Possingham, H.P., Mumby, P.J., Lovelock, C.E., 2016. The cost and feasibility of marine coastal restoration. *Ecol. Appl.* 26, 1055–1074. <https://doi.org/10.1890/15-1077>
- Rubin, Z., Kondolf, G.M., Rios-Touma, B., 2017. Evaluating Stream Restoration Projects: What Do We Learn from Monitoring? *Water* 9, 174. <https://doi.org/10.3390/w9030174>
- Foster, M., Peterson, M.N., Cabbage, F., McMahon, G., 2019. Evaluating natural resource planning for longleaf pine ecosystems in the Southeast United States. *For. Policy Econ.* 100, 142–153. <https://doi.org/10.1016/j.forpol.2018.11.008>
- Ewel, J.J. and F. E. Putz. 2004. A place for alien species in ecosystem restoration. *Frontiers in Ecology and the Environment* 2 (7): 354-360
- Zedler, J. B. and S. Kercher. 2004. Causes and consequences of invasive plants in wetlands: Opportunities, opportunists, and outcomes. *Critical Reviews in Plant Sciences* 23: 431-452.

- Kettenring, K. M. and C. Reinhardt Adams. 2011. Lessons learned from invasive plant control experiments: a systematic review and meta-analysis. *Journal of Applied Ecology*. 48:970-979.
- Tekiela, D.R., Barney, J.N., 2017. Invasion Shadows: The Accumulation and Loss of Ecological Impacts from an Invasive Plant. *Invasive Plant Sci. Manag.* 10, 1–8. <https://doi.org/10.1017/inp.2017.3>
- Invasive Species Terminology: Standardizing for Stakeholder Education [WWW Document], J. Ext. JOE. URL <https://joe.org/joe/2020june/a3.php> (accessed 8.21.20).
- Suazo, A. A., J.E. Fauth, J.D. Roth, C.L. Parkinson, I.J. Stout. 2009. Response of small rodents to habitat restoration and management for the imperiled Florida Scrub-Jay. *Biological Conservation*. 142: 2322-2328.
- Rickey, Marcia A., Carl W. Weekley, and Eric S. Menges. 2013. Felling as a Pre-Treatment for Prescribed Fire Promotes Restoration of Fire-Suppressed Florida Sandhill. *Natural Areas Journal* 33: 199-213.
- Stephens, S.L., Kobziar, L.N., Collins, B.M., Davis, R., Fulé, P.Z., Gaines, W., Ganey, J., Guldin, J.M., Hessburg, P.F., Hiers, K., Hoagland, S., Keane, J.J., Masters, R.E., McKellar, A.E., Montague, W., North, M., Spies, T.A., 2019. Is fire “for the birds”? How two rare species influence fire management across the US. *Front. Ecol. Environ.* 17, 391–399. <https://doi.org/10.1002/fee.2076>
- Menges, E.S. 2008 Restoration demography and genetics of plants: when is a translocation successful? *Australian Journal of Botany* 56: 187-196.
- Rice, K.J. and N.C. Emery. 2003. Managing microevolution: restoration in the face of global change. *Frontiers in Ecology and the Environment* 1:469-478.
- Hallett, et al. 2013. Do we practice what we preach? Goal setting for ecological restoration. *Restoration Ecology* 21:312-319.
- Ruiz-Jaen and Aide. 2005. Restoration Success: How Is It Being Measured? *Restoration Ecology* 13(3) 569-577.
- Zedler, J. B. 2007. Success: An unclear, subjective descriptor of restoration outcomes. *Ecological Restoration* 25:162-168.
- Cook, C.N., Mascia, M.B., Schwartz, M.W., Possingham, H.P., Fuller, R.A., 2013. Achieving Conservation Science that Bridges the Knowledge–Action Boundary. *Conserv. Biol.* 27, 669–678. <https://doi.org/10.1111/cobi.12050>

5 Policies and Requirements

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

5.1 Communication Courtesy and Professionalism

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view. **Respect for individual differences and alternative viewpoints will be maintained in this class at all times.** All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students’ Office.

5.2 Make-up Exam and Late Assignments Policy

Make-up exams will only be offered to those who obtain permission from me in advance, and who have a legitimate excuse. If you are unsure whether or not your situation qualifies, contact me immediately. I will generally require independent verification for emergencies that arise after the class meeting prior to the exam (e.g. doctor's note). The same policy holds for assignments.

For assignments not turned in on time, 10 percentage points will be subtracted from the original grade for each day that the assignment is late. An assignment is considered late if it is not handed in by 8pm on the day the assignment is due. No extensions will be granted.

Students are responsible for keeping track of dates of exams, quizzes, and assignment due dates as presented in the syllabus. Changes to these major dates will not be made, or if they do need to be altered, a class-wide ELearning "Announcement" will be made with email notification.

5.3 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course.

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

An incomplete will be assigned at the discretion of the instructor when, due to extraordinary circumstances, a student is prevented from completing the work of the course on time. A written agreement between the instructor and student prior to the end of the semester is necessary to arrange for completion of the course.

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

5.4 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required, but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at

<https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

5.5 Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office. <http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.docx>

5.6 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

5.7 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: <http://multicultural.ufl.edu>.

5.8 Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. [Click here to get started with the Disability Resource Center](#). 0001 Reid Hall, 352-392-8565, disability.ufl.edu

5.9 Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

5.9.1 Lecture recordings policy

Students may not publish recordings without the written consent of the lecturer. Policies regarding student in-class/recorded lecture recordings are detailed here <http://aa.ufl.edu/policies/in-class-recording/>.

6 Campus Helping Resources

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

6.1 Student Life, Wellness, and Counseling Help

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness resources <http://www.counseling.ufl.edu/cwc/>
- U Matter, We Care <http://www.umatter.ufl.edu/>
- Career Connections Center <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

6.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course

satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: <http://www.distance.ufl.edu/student-complaint-process>
- Students in face-to-face courses: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>