Syllabus
CEE 694-50-4265 Wetland Design
University of Louisville, Department of Civil and Environmental Engineering
Speed School Summer Session 2026

Course Description

Wetland Design is a graduate-level online course that teaches students how to design and construct naturally appearing, fully functioning wetlands. There are no traditional classroom sessions. Instead, students work through detailed instructional modules that explain:

- The ecological and societal values of wetlands
- How and why wetlands were historically drained and altered
- Critical factors influencing site selection for restoration
- Proven construction techniques using hand tools and heavy equipment
- Methods for repairing nonfunctioning wetlands

The course emphasizes practical, low-cost, and highly effective restoration practices that result in wetlands requiring little, if any, long-term maintenance. Students learn design approaches that avoid unnecessary infrastructure such as pipes, berms, and water control structures whenever possible.

Real-world examples from across North America demonstrate how wetlands can be designed to:

- Provide habitat for rare and threatened species
- Supply water for livestock
- Improve water quality
- Manage stormwater
- Recharge groundwater
- Reduce downstream flooding

The instructor is actively engaged in the restoration of wetlands and streams across North America and integrates current field projects, case studies, and construction footage into the curriculum.

Assignments are completed independently, with some requiring outdoor field observation and site evaluation. Students in engineering, biology, hydrology, environmental science, and landscape architecture are encouraged to enroll.

Registration

Wetland Design is open to U-of-L students who are enrolled in a degree program and non-U of L students who would like to take the class. Non-U of L students interested in taking this course must apply for acceptance into Graduate School at U of L http://louisville.edu/graduate/

Those holding a bachelor's degree in a related field from a regionally accredited institution may apply for Graduate School at U of L. You would need to request that your college transcripts be

sent to U of L. You are responsible for contacting your school(s) and requesting that official transcripts be sent. You are also responsible for any fees associated with these requests.

Course Instructor

Thomas R. Biebighauser
Wildlife Biologist & Wetland Ecologist
Wetland Restoration and Training LLC
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Email: tombiebighauser@gmail.com
Website: https://wetlandrestorationandtraining.com

Please send all emails and completed assignments to tombiebighauser@gmail.com as he does not use the UofL email system. Tom Biebighauser will not receive your questions or assignments if you email them to the UofL email address listed for him.

You are asked not to upload assignments to Blackboard for this course.

Credits = 3

Course Dates: May 11 to July 25, 2026. The Final Exam must be completed by 6:00pm (EDT) on July 22, 2026.

This is an online class where lessons and assignments may be completed at any time during the day or night. Quizzes, assignments, and exams must be completed by the dates and times listed in Blackboard. The current week's lessons and assignments should be completed prior to the next week's scheduled lessons. Students are expected to work independently in this class. There are no group assignments or required field trips.

Student Learning Outcomes

Through Videos, PowerPoint presentations, readings, and independent assignments requiring trips outdoors, students are expected to:

1. Learn how to name different types of wetlands.
2. Know the primary values of wetlands of different types.
3. Recognize the signs of wetland drainage and understand the principles of drainage.
4. Know how to select and evaluate sites for wetland restoration and construction.
5. Understand the primary techniques available for building wetlands.
6. Recognize threats to natural and constructed wetlands.
7. Find how to repair failed wetlands.
8. Explain the concepts of wetland spillway construction and maintenance.
9. Understand how to design wetlands for various purposes.

10. Recognize the basics of supervising the construction and planting of wetlands.
11. Outline strategies for developing partnerships and obtaining funding for wetland projects.
12. Understand the process for obtaining required permits from the government prior to implementation of a wetland project.

Textbook Required:

Thomas R. Biebighauser. *Wetland Restoration and Construction - A Technical Guide*. Upper Susquehanna Coalition, 186 pages, 2023 3rd-edition (earlier editions are acceptable)

May be ordered from:

https://www.forestry-suppliers.com/product_pages/products.php?mi=48410&itemnum=59963

https://www.amazon.com/Wetland-Restoration-Construction-Technical-Guide-dp-0983455821/dp/0983455821/ref=dp_ob_title_bk

This book should be ordered in advance of taking the class. Please do not wait until the last minute to place your order. It would be very difficult to pass this course without reading this book.

Course Outline

Week 1

Wetland restoration and values

a) How wetlands appear and function
b) The various types of wetlands
c) Animals and plants found in wetlands.

Required reading:
Wetland Restoration and Construction - A Technical Guide; Introduction & Quiz
Wetland Restoration and Construction - A Technical Guide; Chapter 1 & Quiz
Publications that are listed on Blackboard (no quiz on these).

Videos to view:

- You can Build a Wetland & Quiz
- Wetland Types and Values & Quiz

Assignment 1.0: Mosquitoes and Wetlands

Quizzes and Assignment are due on Saturday, May 16, 2026, by 6:00pm.

Week 2

Wetland Drainage

a) Moving and channeling streams
b) Ditch digging.
c) Burying wood, rock, clay tile, and plastic drainage structures
d) Filling wetlands with soil
e) Modifying the surface of wetlands so they will drain
f) Recognizing historically drained wetlands

Required reading:
Wetland Restoration and Construction - A Technical Guide; Chapter 2 & Quiz

Videos to view:

- History of Wetland Drainage-How our Wetlands were Drained and Filled
- How to Identify Drained Wetlands & Quiz
- Office Identification of Possible Wetland Projects & Quiz

Assignment 2.0: Identification of Drained Wetlands

Quizzes and Assignment are due on Saturday, May 23, 2026, by 6:00pm.

Week 3

Wetland Design

a) Selecting locations for building a wetland
b) Measuring slope by using a laser level
c) Marking wetland construction sites

Required reading:
Wetland Restoration and Construction - A Technical Guide; Chapter 3 & Quiz

Videos to view:

- Selecting a Location for Building a Wetland & Quiz
- How to Use a Laser Level and Dual Sided Grade Rod & Quiz
- Marking the Perimeter of a Wetland for Construction & Quiz

Quizzes are due on Saturday, May 30, 2026, by 6:00pm.

Week 4

Wetland Design Steps

a) Examining wetlands that were built 2,000-years ago.
b) Importance of digging test holes
c) The Various Techniques for Building Wetlands

Assigned reading:
Wetland Restoration and Construction - A Technical Guide; Chapter 4 & Quiz

Videos to View:

- These Wetlands are 2,000-years Old & Quiz
- Digging a Test Hole & Quiz
- Digging Deep Test Holes for Wetland Design & Quiz
- Build a Wetland That Will Last Forever & Quiz

Quizzes are due on Saturday, June 6, 2026, at 6:00pm.

Week 5

Wetland construction Techniques

a) Groundwater dams
b) Compacted Clay Liners
c) Spillway Design
d) Controlling Head-cuts

Assigned reading: Publications listed on Blackboard (no quiz on these)

Videos to View:

- Groundwater Dam Construction for Wetland Restoration & Quiz
- Compacted Clay Liner Technique
- Wetland Spillway Construction
- Control of Erosional Head-cuts
- Building Wetlands in Timber Harvest Areas

Quizzes are due on Saturday, June 13, 2026, until 6:00pm.

Week 6

Groundwater and Wetland Restoration

a) Responding to variations in groundwater elevation
b) Removal of concrete liners
c) Heavy equipment considerations

Assigned reading:
Wetland Restoration and Construction - A Technical Guide; Chapter 5 & Quiz

Videos to View:

- Wetland Restoration Using the Groundwater Technique on the Putnam Farm & Quiz
- Wellesley College Botanic Gardens Wetland Restoration & Quiz
- Logs can Keep You from Sinking & Quiz
- Restoring Isolated Lakes and Wetlands & Quiz

Quizzes are due on Saturday, June 20, 2026, at 6:00pm.

Week 7

Assigned reading:

- Wetland Restoration and Construction a Technical Guide (Chapter 6): Building Wetlands of Various Types & Quiz
- Wetland Restoration and Construction a Technical Guide (Chapter 7): Developing Wetlands Using Liners at Schools & Quiz

Videos to View

- Wetland Construction Using Aquatic Safe Liners & Quiz
- Building Wetlands in the Desert & Quiz

Assignment 3: Wetland Design Form

Quizzes and Assignment are due on Saturday, June 27, 2026, by 6:00pm.

Week 8
Assigned reading:

- Wetland Restoration and Construction a Technical Guide (Chapter 8) Establishing the Preferred Vegetation & Quiz
- Wetland Restoration and Construction a Technical Guide (Chapter 9) Designing Wetlands for Wildlife & Quiz

Video to View: Rough and Loosen Technique & Quiz

Presentation: Establishing Native Plants & Quiz

Assignment 4: Native Plants

Quizzes and Assignment are due on Saturday, July 4, 2026, by 6:00pm.

Week 9
Assigned reading:

- Wetland Restoration and Construction a Technical Guide (Chapter 10) Obtaining Government Permits & Quiz
- Wetland Restoration and Construction a Technical Guide (Chapter 11) Renovation and Maintenance & Quiz

Presentation: Government Permits & Quiz

Videos to View:

- Inspection and Maintenance of Wetland and Pond Dams
- Impoundment Construction and Management
- Restoring Wetlands and Streams from Constructed Impoundments
- Wayne National Forest Wetlands after 30-years

Quizzes are due on Saturday, July 11, 2026, by 6:00pm.

Week 10
Assigned reading:

- Wetland Restoration and Construction a Technical Guide (Chapter 12) Stream Restoration & Quiz
- Wetland Restoration and Construction a Technical Guide (Chapter 13) Finding Funding & Quiz

Videos to View:

- Slabcamp Stream and Valley Restoration Project & Quiz
- Dam Removal and Valley Restoration & Quiz

Presentation: Partnerships and Funding for Wetland Projects and Quiz

Quizzes are due on Saturday, July 18, 2026, at 6:00pm.

Final Exam (Build a Wetland)
Must be completed by July 22, 2026, at 6:00pm

Extra Credit Assignment Opportunities
One or more may be completed by July 18, 2026, by 6:00pm

Grading

The final letter grade (includes + or -) for the course is based primarily on the total number of points earned for the course. Added points may be earned by completing extra-credit assignments. Extra credit points will be added to the total number of points you have earned for the course to improve your letter grade. It is highly recommended that you complete one or more extra credit assignments to increase the number of points you have earned and to improve your letter grade. Extra-credit assignments may be emailed to tombiebighauser@gmail.com any time prior to July 18, 2026, at 6:00pm.

Percent	Letter Grade
97-100	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-

Assigned Reading should be completed prior to taking the quiz on that reading assignment. Expect the information contained in assigned readings to be included in Quizzes and Exams. Blackboard will note if you will not be tested on certain readings.

Quizzes are posted on Blackboard for each Video and Presentation. The quiz for each Video and Presentation should be taken after you have viewed that Video or Presentation. You will not do well in this course if you only watch the Videos and do not read the Assigned Readings or watch the Presentations. To receive credit for taking a quiz, the quiz must be completed by the due date and time listed in the syllabus and on Blackboard for that quiz. You are allowed only 10 minutes to take each quiz. The quizzes will "disappear" from your view and not be available for taking or reviewing after the due date and time. Extensions will not be given for taking quizzes. Each quiz must be completed in one session; it cannot be stopped and resumed at a later time and date.

Assignments must be completed and received by tombiebighauser@gmail.com by the due date and time listed in the syllabus and on Blackboard to receive credit. Assignments will be graded with full credit being given to work that is complete and responds fully to the guidelines and questions posted on Blackboard. Assignments will be accepted up to 3-days after the due date; however, the score received will be reduced by 30-percent for each day the assignment is late. You are asked not to upload your completed assignments to Blackboard. The due dates for assignments are listed on the syllabus, and on Blackboard. Each assignment must be in Word format. Your name must be listed on each assignment. The actual computer file name for each assignment must contain your name and assignment number. Include your last name and assignment number in the subject line of each message. The photos included in each assignment must be reduced in size. The maximum file size for each assignment should be 4MB or less.

Instructor Modifications
Reading Assignments, Videos, Presentations, and other Assignments will be posted by the instructor two or more weeks in advance of the scheduled due date. Material may be added or modified by the instructor up to two weeks prior to the date of the next scheduled class. However, errors will be corrected when found.

Questions
E-mail is the preferred way of asking questions of the primary instructor. Students should e-mail Tom Biebighauser tombiebighauser@gmail.com with their questions and can expect a reply to their e-mail within 24-hours. Tom Biebighauser designs and restores wetlands and streams full-time across the United States and Canada, and grades assignments and responds to emails in evenings.

Approval Needed for Duplication

All the materials relating to this class are copyrighted by Thomas R. Biebighauser. Students are not allowed to duplicate or share these materials electronically or in printed form without advanced approval in writing from Thomas R. Biebighauser.

Title IX/Clery Act Notification

Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (852-2663), Counseling Center (852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

For more information, see the Sexual Misconduct Resource Guide.
https://louisville.edu/titleix/sexual_misconduct_resource_guide.pdf

About the Instructor

Tom Biebighauser has restored more than 3,600 wetlands and streams across Canada, 27 U.S. states, Mexico, New Zealand, Puerto Rico, and Taiwan during the past 48 years. He has developed highly effective, low-cost techniques for building wetlands and streams that clean runoff, recharge groundwater, and provide habitat for rare species of plants and animals.

Tom retired from the U.S. Forest Service in 2013 after a 34-year career as a Wildlife Biologist, during which he initiated wetland and stream restoration programs throughout the United States and Canada. Since retirement he's been restoring over 100 wetlands and streams each year. Over the course of his career, he has built more than 1,400 dams and has since decommissioned over 300 dams to restore natural hydrology and valley function.

Tom currently instructs a graduate-level course in Wetland Design at the University of Louisville Speed School of Engineering and teaches classes for the University of Alberta and the British Columbia Institute of Technology. He is the author of four books on wetland restoration and has received 45 awards recognizing his outstanding contributions to wetland and stream restoration.