

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. **The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.**

College: CITE

Dept/Division: ES AS&T

Alpha Designator/Number: ES555 ⁵⁵⁴☒ Graded ☐ CR/NC

Contact Person: Scott Simonton

Phone: 746-2045

NEW COURSE DATA:

New Course Title: Watershed Protection and Stream Restoration

Alpha Designator/Number:

E S ⁵⁵⁴ ~~555~~

Title Abbreviation:

W a t e r s h e d P r o t e c t i o n

(Limit of 25 characters and spaces)

Course Catalog Description:
(Limit of 30 words)

This course reviews key components of watershed structure and functions before Investigating and applying concepts for managing and restoring aquatic ecosystems.

Co-requisite(s): NA

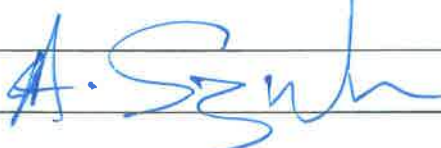


First Term to be Offered: Spring 2016

Prerequisite(s): NA

Credit Hours: 3

Course(s) being deleted in place of this addition (must submit course deletion form): NA

Signatures: If disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head 	Date <u>4-6-15</u>
Registrar  030103	Date <u>4/8/15</u>
College Curriculum Chair 	Date <u>4/7/15</u>
Graduate Council Chair _____	Date _____

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College: CITE

Department/Division: ES AS&T

Alpha Designator/Number: ES555-554

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Dr. Scott Simonton
Dr. Mindy Armstead

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "**Not Applicable**" if not applicable.

NA

3. REQUIRED COURSE: If this course will be required by another department(s), identify it/them by name. Enter "**Not Applicable**" if not applicable.

NA

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "**Not Applicable**" if not applicable.

NA

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "**Not Applicable**" if not applicable.

NA

6. COURSE OBJECTIVES: (May be submitted as a separate document)

Attached

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7. COURSE OUTLINE (May be submitted as a separate document)

Attached

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

Attached

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

Lecture, discussion, case study evaluation, group projects

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10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

Discussion questions, projects, mid-term and final exams

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

Greater detail required in data evaluation, project development and discussion questions

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

attached

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Please Insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:
Course Number and Title:
Catalog Description:
Prerequisites:
First Term Offered:
Credit Hours:

Department: CITE ES AS&T
Course Number and Title: Watershed Protection and Stream Restoration
Catalog Description: This course reviews key components of watershed structure and functions before investigating and applying concepts for managing and restoring aquatic ecosystems.
Prerequisites: NA
First Term Offered: Spring 2016
Credit Hours: 3

Watershed Protection and Stream Restoration Course Outline

		Readings	Assignments
Week 1	Review watershed relationships: Watershed functions/processes	Methods in Stream Ecology	
Week 2	Review watershed relationships: upland land uses and stream system health		
Week 3	Review watershed relationships: type and affects of land use scenarios		Discussion Question #1
Week 4	Designating uses	Case studies	
Week 5	Protecting uses - Hydrologic, physical and chemical impairment		
Week 6	Protecting uses - 303(d), TMDL process, Source Water Protection	US EPA Guidance Documents	Class Presentations
Week 7	Mechanisms for evaluating use attainment – water quality criteria, biocriteria, others	US EPA Guidance Documents	Mid-term handed out
Week 8	Mechanisms for evaluating use attainment - TMDL case studies	WVDEP and USEPA examples	Mid-term due
Week 9	Prioritizing Competing Uses Restoration - the global strategy	http://www.unwater.org/activities/thematic-priority-areas/water-quality/en/	

Week 10	Prioritizing Competing Uses Restoration – in the United States and locally Begin Restoration	Case studies – to be distributed	
Week 11	Restoration - Theory	Chapters in Rosgen, 1996	Discussion Question #2
Week 12	Restoration methods	USDA, 1998	
Week 13	Implementation Restoration Techniques		Class Presentations
Week 14	Case studies in Restoration	Case studies – to be distributed	
Week 15 Dead week	Evaluating Restoration Success		Restoration write- up due Final exam distributed

Course catalog description: This course reviews key components of watershed structure and functions before applying concepts for managing and restoring aquatic ecosystems. Topics include designating uses, protecting uses, prioritizing competing interests, recognizing disturbance types and effects, and selection and implementation of appropriate restoration techniques.

} Not current.
Refer to form.

Course objectives: To understand watershed components and functions, to understand relationships between land use and aquatic system health, to understand watershed disturbance and to explore currently accepted mechanisms for evaluating watershed uses and protecting uses, to comprehend restoration theory adequately that students select appropriate restoration tools from available alternatives for successful application to diverse disturbance scenarios

Potential textbooks to be use for Watershed Protection and Stream Restoration

Stream Restoration: A natural channel design handbook. Doll, F.A., GL Grabow, K.R. Hall, J. Halley, W.A. Hartman, G.D. Jennings & D.E. Wise. NC Stream Restoration Institute. NC State University 128 ppp. 2003.

Applied River Morphology 2nd ed., Dave Rosgen. Fort Collins, Wildland Hydrology Pubs. 1996

Stream and Watershed Restoration: A Guide to Restoring Riverine Processes and Habitats. Philip Roni (Editor), Tim Beechie (Editor), ISBN: 978-1-4051-9956-8 316 pages, December 2012, Wiley-Blackwell

Stream Restoration in Dynamic Fluvial Systems: Scientific Approaches, Analysis, and Tools. A. Simon, S.J. Bennett and J.M. Castro (editors). American Geophysical Union. 2011. ISBN-13: 978-0875904832

Bibliography

Watershed Protection and Stream Restoration

Bernhardt, E.S. & M.A. Palmer. 2007. Restoring streams in an urbanizing world. *Freshwater Biology* 52:738-751

Beechie, T.J., D.A. Sear, J.D. Olden, G.R. Pess, J.M. Buffington, H. Moir, P. Roni, & M.M. Pollack. 2010. Process-based principles for restoring river ecosystems. *Bioscience* 60:209-222.

Christy R. Violin, Peter Cada, Elizabeth B. Sudduth, Brooke A. Hassett, David L. Penrose, and Emily S. Bernhardt 2011. Effects of urbanization and urban stream restoration on the physical and biological structure of stream ecosystems. *Ecological Applications* 21:1932–1949

Doyle, M.W., F.D. Shields. 2012. Compensatory mitigation for streams under the Clean Water Act: Reassessing science and redirecting policy. *J. Am. Water Resour. Assoc.* 48:494-509.

Kondolf, G. M., A. J. Boulton, S. O'Daniel, G. C. Poole, F. J. Rahel, E. H. Stanley, E. Wohl, A. Bång, J. Carlstrom, C. Cristoni, H. Huber, S. Koljonen, P. Louhi, and K. Nakamura 2006. Process-based ecological river restoration: visualizing three-dimensional connectivity and dynamic vectors to recover lost linkages. *Ecology and Society* 11(2): 5.

Millennium Development Goals Report. 2014 United Nations Department of Economic and Social Affairs.

Nilsson, C., R. Jansson, B. Malmqvist, and R. J. Naiman 2007. Restoring riverine landscapes: the challenge of identifying priorities, reference states, and techniques. *Ecology and Society* 12(1): 16.

Palmer, M.A. & K.L. Hondula. 2014. Restoration as Mitigation: Analysis of Stream Mitigation for Coal Mining Impacts in Southern Appalachia. *Environ. Sci. Technol.* 48:10552-10560.

Petty, J.T., G. Gingerich, J.T. Anderson, and P.F. Ziemkiewicz. 2013. Ecological function of constructed perennial stream channels on reclaimed surface coal mines. *Hydrobiologia* 720:39-53.

Nilsson, C., R. Jansson, B. Malmqvist, and R. J. Naiman 2007. Restoring riverine landscapes: the challenge of identifying priorities, reference states, and techniques. *Ecology and Society* 12(1): 16.

Ryder, D.S. & W. Miller. 2005. Setting goals and measuring success: linking patterns and processes in stream restoration. *Hydrobiologia* 552:147-158.

Schiff, R., G. Benoit, and J. MacBroom. 2011. Evaluating stream restoration: A case study from two partially developed 4th order Connecticut, USA streams and evaluating monitoring strategies. *River Research and Applications* 27(4): 431-460.

Stream Corridor Restoration: Principles, Processes & Practices GPO Item#0120-A
Sci Docs No A57.6/2:EN 3/PT.653

Wortley, L., J.M. Hero & M. Howes. 2013. Evaluating Ecological Restoration Success: A Review of the Literature. *Restoration Ecology* 21(5) 537-543.