

## Dougherty CV

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### Education:

Ph.D. / May 2004 / Civil & Envir. Engineering / Virginia Tech, Blacksburg, VA, USA  
M.S. / 1995 / Biological Systems Engineering / Virginia Tech, Blacksburg, VA, USA  
B.S. / 1990 / Agricultural Engineering / Texas Tech, Lubbock, TX, USA  
B.S. / 1978 / Geography / Clarion University, Clarion, PA, USA

### Research Interests:

Water resources, engineering aspects of water quality, surveying, mapping, and geographic information systems. Water quality management and source water protection using watershed-scale geographic information and modeling systems. Efficient and precise irrigation and fertigation of cotton and other crops using subsurface drip irrigation (SDI). Waste management, including reuse of municipal and agricultural residuals and treated effluent.

### Research Statement:

Sustainable development is one of the most challenging areas facing today's societies. The challenge is to strike a balance between a sustainable environment and an acceptable level of economic progress. My goal is to advance our awareness of the key environmental and social processes impacting public water resources.

### Professional Certification:

Registered Professional Engineer: Alabama (2005), Virginia (1999), Pennsylvania (1999), New York (1996).

Certified Professional in Erosion and Sediment Control (2009).

Certified Landscape Irrigation Auditor (2009).

### Professional Experience:

Associate Professor, Biosystems Engineering Department, Auburn University  
Auburn, AL, August 2010 - present

Assistant Professor, Biosystems Engineering Department, Auburn University  
Auburn, AL, August 2004 – July 2010

Research Fellow, Charles E. Via, Jr. Department of Civil & Envir. Engineering, Virginia Tech  
Blacksburg, VA, September 2000 – 2004

Project Engineer, Anderson and Associates, Inc.  
Blacksburg, VA, Sept. 1999 – Sept. 2000

Research Assistant, Forestry Department, Virginia Tech  
Blacksburg, VA, August 1998 – August 1999

Staff Engineer, Natural Resource, Agriculture, and Engineering Service (NRAES)  
Ithaca, NY, March 1995 - August 1998

Graduate Research Assistant, Biological Systems Engineering Department, Virginia Tech

Blacksburg, VA, August 1993 – March 1995

Assistant Design Engineer, Hayter Engineering, Inc.  
Paris, TX, June 1990 - June 1993

**Peer-reviewed Publications:**

1. Dougherty, M., Burger, J.A., and C.M. Feldhake, C.M., and A.H. AbdelGadir. 2013. Calibration and use of plate meter regressions for pasture mass estimation in an Appalachian silvopasture. *Archives of Agronomy and Soil Science* 59(2):305-315, doi: 10.1080/03650340.2011.615026.
2. AbdelGadir, A.H., Dougherty, M., Fulton, J.P., Curtis, L.M., Tyson, T.W., Harkins, H.D., and B.E. Norris. 2012. Effect of Different Deficit-Irrigation Capabilities on Cotton Yield in the Tennessee Valley. *Irrigation and Drainage Systems Engineering*, doi: 10.4172/2168-9768.1000102.
3. He, J.\*, Dougherty, M., Arriaga, F., Fulton, J., Wood, C., Shaw, and C. Lange, C. 2012. Short-term soil nutrient impact in a real-time drain field soil moisture controlled SDI wastewater disposal system. *Irrigation Science*, doi: 10.1007/s00271-011-0292-2.
4. Bhattarai, N.\*, Dougherty, M., Marzen, L., and L. Kalin. 2011. Validation of evaporation estimates from a modified surface energy balance algorithm for land (SEBAL) model in the southeastern US. *Remote Sensing Letters*, 3:6, 511-519.
5. Elias, E.\*, Dougherty, M., Srivastava, P., and D. Laband. 2011. The impact of forest to urban land conversion on streamflow, total nitrogen, total phosphorus, and total organic carbon inputs to the Converse Reservoir, Southern Alabama, USA. *Urban Ecosystems*, doi: 10.1007/s11252-011-0198-z.
6. AbdelGadir, A.H., Fulton, J.P., Dougherty, M., Curtis, L.M., van Santen, E., Burmester, C.H., Harkins, H.D., and B.E. Norris. 2011. Subsurface drip irrigation placement and cotton irrigation water requirement in the Tennessee Valley. *Crop Management*, August 2011, doi:10.1094/CM-2011-0819-01-RS.
7. He, J.\*, Dougherty, M., Shaw, J., Fulton, J., and F. Arriaga. 2011. Hydraulic management of a soil moisture controlled SDI wastewater dispersal system in an Alabama Black Belt soil. *J. Environmental Management*, doi: 10.1016/j.jenvman.2011.05.009.
8. He, J.\*, Dougherty, M., Zellmer, R., and G. Martin. 2011. Assessing the status of onsite wastewater treatment systems in the Alabama Black Belt soil area. *Environmental Engineering Science*, 28(10):693-699.
9. Harbuck, T.L.\*, J. P. Fulton, M. Dougherty, S. T. Taylor, D.J. Eakes, and J.L. Sibley. 2011. In-Field Application Uniformity Evaluation of Pressure-Compensating Subsurface-Drip Irrigation Products. *J. Applied Engineering in Agriculture* 27(1): 43-50.
10. Dougherty, M., Hein, M.S., Martina, B.A., and B.K. Ferguson. 2011. A quick surface infiltration test to assess maintenance needs on small pervious concrete sites. *Journal of Irrigation and Drainage Engineering* 137(8): 553-563.
11. Dougherty, M., AbdelGadir, A.H., Fulton, J.P., van Santen, E., Curtis, L.M., Burmester, C.H., Harkins, H.D., and B.F. Norris. 2009. Subsurface drip irrigation and fertigation for North Alabama cotton production. *Journal of Cotton Science* 13:227-237.
12. Guertal, E.A., Dougherty, M., and E. van Santen. 2009. Soil and effluent irrigation nutrient monitoring of an Alabama golf course. *Applied Turfgrass Science*, doi: 10.1094/ATS-2009-1014-01-RS.
13. He, J.\*, Lange, C.E., Dougherty, M. 2009. Laboratory study using paper mill lime mud for agronomic benefit. *Process Safety and Environmental Protection* 87 (2009) 401-405.
14. Dougherty, M., Welsh, R., King, S., and E. Vis. 2009. Teaching landscape irrigation design to non-engineering college students. *J. Applied Engineering in Agriculture*. 254 (2):299-310.

15. Dougherty, M., Vaughan, D.H., Evanylo, G.K., Collins, E.R., Jr., and A.H. AbdelGadir. 2009. Nitrogen values of liquid dairy manure and dry broiler litter as affected by preservation treatment. *J. Applied Engineering in Agriculture*. 25 (3):363-371.
16. Yang, K., He, J.\*, Dougherty, M., Yang, X., Li, L. 2009. Municipal Wastewater Treatment Through an Aerobic Biofilm SBR. *Water Science and Technology*. 59(5): 917-926.
17. LeBleu, C., Dougherty, M., Brantley, E., and C. Francis. 2008. Assessing nutrient reduction in a rain garden with an internal water storage (IWS) layer *In Negotiating Landscapes, Proceedings of CELA 2007: The Council of Educators in Landscape Arch.*, August 14-19, State College, PA.
18. Dougherty, M., Bayne, D., Curtis, L., Reutebuch, E., and W. Seesock. 2007. Water quality in a non-traditional off-stream polyethylene-lined reservoir. *J. Environmental Management* 85 (2007) 1015-1023.
19. Dougherty, M., Dymond, R.L., Grizzard, T.J., Jr. , Godrej, A.N., Zipper, C.E., Randolph, J., and C.M. Anderson-Cook. 2006. Empirical modeling of hydrologic and NPS pollutant flux in an urbanizing basin. *J.American Water Resources Association* 42 (5) Oct 2006.
20. Dougherty, M., Dymond, R.L., Grizzard, T., Godrej, A., Zipper, C., and J. Randolph. 2006. Quantifying long-term NPS pollutant flux in an urbanizing watershed. *J.Environmental Engineering* 132 (4), 547-554.
21. Dougherty, M., Dymond, R.L., Goetz, S.J., Jantz, C.A., and N. Goulet. 2004. Evaluation of impervious surface estimates in a rapidly urbanizing watershed. *Photogrammetric Engineering & Remote Sensing*, 70(11):1275-1284.

#### **Books:**

- Dougherty, M. (ed). 1999. Field guide to on-farm composting. Ithaca, NY: *Natural Resource, Agriculture, and Engineering Service (NRAES)*, 128 pp.
- Dougherty, M. (ed). 1998. Composting for municipalities: planning and design. Ithaca, NY: *Natural Resource, Agriculture, and Engineering Service (NRAES)*, 136 pp.
- Dougherty, M., Goehring, L.D., and P. Wright. 1998. Liquid manure application systems design manual. Ithaca, NY: *Northeast Regional Agricultural Engineering Service (NRAES)*, 168 pp.
- Carson, J. and M. Dougherty (ed). 1997 Rev. Post-frame building handbook: materials, design considerations, construction procedures. Ithaca, NY: *Northeast Regional Agricultural Engineering Service (NRAES)*, 79 pp.

#### **Synergistic Activities:**

Dougherty provides support for Auburn University's College of Agriculture research program in erosion and sediment control through vegetation establishment. In this role, he facilitates interdisciplinary teamwork between several university departments including Agronomy & Soils, Civil Engineering, Landscape Architecture, and Forestry and Wildlife Sciences.

Dougherty has led a multidisciplinary effort in evaluation of bioretention contaminant uptake and removal in two experimental rain garden studies at Auburn University. Team members from Agronomy & Soils, Landscape Architecture, and Biosystems Engineering provided assessment and monitoring of nutrient and contaminant mass balance for design and maintenance of bioretention stormwater control.

Dougherty has provided targeted irrigation research in the areas of fertigation, pivot irrigation, and precision agriculture in support of Auburn University's Land Grant mission, incorporating technologies such as remote sensing and GIS for improved irrigation scheduling and energy efficiency. Dougherty initiated collaboration between agronomists at Alabama A&M and Auburn University to investigate rotation of canola with cotton and soybeans as an oil and energy rotation to improve the energy balance and productivity of Alabama agriculture.

Dougherty has taken a support role in a team investigating the biological water quality and water quantity benefits of pervious pavements for green infrastructure engineering. Scientists and engineers from Auburn University departments of Building Science, Civil Engineering, and Landscape Architecture have collaborated to seek extramural funding for paired laboratory and field research to compare ecological benefit from a variety of pervious, infiltration promoting materials.

**Awards/Affiliations:**

Outstanding Faculty, Biosystems Engineering, 2011  
President's Outstanding Collaborative Units Award, 2011  
Outstanding Faculty, Biosystems Engineering, 2010  
Alabama Professional Engineer, 2005  
Appointed, Auburn University graduate faculty, October 2004.  
ASAE Blue Ribbon Award – two NRAES publications, 1998  
American Society of Agricultural and Biological Engineers

**Teaching:**

BSEN 7950 Seminar for Biosystems Engineering  
BSEN 4560 Site Design  
BSEN 3560 Turf Systems Irrigation Design  
BSEN 4210 Irrigation Design  
BSEN 4310 Engineering Design for Biosystems

**Teaching aids developed:**

Summer 2009: In preparation for new Site Design Course (BSEN 4560), taught for the first time in Fall 2009, three learning modules were developed, including 1) site feasibility assessment, 2) road alignment design in ACAD, and 3) collection and mapping of field survey information. Active interfacing GIS and ACAD software was also incorporated as part of class-assigned design projects.

December 2009: In consultation with co-instructor, Dr. Fasina, revised major deliverable milestones for Senior Design Captone class (BSEN 4310) to include two new milestones – preliminary CAD drawings and pre-final submittal drawings.

Spring 2005: Irrigation design labs – soil moisture, soil moisture characteristics, introduction to topographic mapping and surveying, horizontal and vertical angle determination, auto-leveling, irrigation efficiency and uniformity, sprinkler irrigation, trickle irrigation.

Spring 2005: Overview lab and lecture for the Dept. of Fisheries and Allied Aquaculture Facilities class, including development of a pump dynamics lab and corresponding lecture on piping systems and pump selection.

Fall 2004: Turf irrigation modules – depth of application and uniformity lab, trickle irrigation, electrical controls, electrical wiring, pumps and pressure, pipes and valves, sprinkler types, sprinkler layout.