

LOW IMPACT DEVELOPMENT
CVEG 563 Special Problems

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Resources: There is no required textbook.
I encourage you to obtain a guidance document for your local authority, where you want to do your project, or another location of interest. Some well-accepted documents include:

North Carolina: Low Impact Development: A Guidebook for North Carolina – 2009
Available at: <http://www.ces.ncsu.edu/depts/agecon/WECO/lidguidebook/>

Puget Sound: Low Impact Development: Technical Guidance for Puget Sound - 2012
http://www.psp.wa.gov/downloads/LID/20121221_LIDmanual_FINAL_secure.pdf

Websites: <http://www.lid-stormwater.net/> , <http://www.lowimpactdevelopment.org/>

Software (if links don't work, just google it):

EPA Stormwater Calculator:

<https://www.epa.gov/water-research/national-stormwater-calculator>

Win TR-55:

<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?cid=stelprdb1042901>

EPA SWMM:

<https://www.epa.gov/water-research/storm-water-management-model-swmm>

Books: *Low Impact Development, a design manual for urban areas*,
UA Community Design Center
University of Arkansas Press, 2010

Low Impact Development and Sustainable Stormwater Management

Thomas H. Cahill

Wiley, July 2012, 312 pages

ISBN: 978-0-470-09675-8

Objective: To understand the purposes and aspects of low impact design and to apply LID principles to storm water management and site development.

Grading: 50% Project; 50% Assignments and quizzes.
A: 90+, B:70-89, C:60-69.

Design Project:

Choose a property to develop or redevelop using LID principles. Choose, size, and place LID BMPs on the site. Perform hydrologic analyses on the site.

Required components:

- Documented guidelines, procedures, and regulations.
- Application of software. Students typically use EPA Stormwater model for volume calculations and TR-55 to develop a hydrograph.
- Tabulation of pre-development, LID, and (if applicable) post-development (non-LID) hydrology including: CN, T_c , flow rates, water volume balances, and/or other measures. Document and reference all procedures.
- Quantitative and qualitative discussion of water quality effects using documented sources.

Lecture	topic	exercise
	<u>I. Low Impact Development Overview</u>	
1	Introduction, course format, project	obtain documents and software
2	LID Definitions and Technologies	definition fill-in-the-blank
3	LID Technologies	technology fill-in-the-blank
4	Hydrologic Cycle, hydrographs, water quality	fill-in-the-blank
5	Water quality and loads	PA Stormwater videos
6	LID examples (Marty Matlock)	
7	LID and LEED (Karen Steward)	
	<u>II. Hydrology</u>	
8	Precipitation	IDF curves
9	Runoff and Infiltration	Volume calculations
10	Time of Concentration	TOC exercise
11	Rational Method	Rational Method calculation
12	NRCS (SCS) Method	Church Example
13	NRCS Peak Method	Church Example part II
14	Water Quality considerations	Iowa Example
	<u>III. Water Flow</u>	
15	Open channel flow	Mannings equation exercise
16	Stream morphology	Stream morphology exercise
17	Stream restoration (Matt Van Epps)	
18	Retention time and settling	
	<u>IV. Applications</u>	
19	Community by Design (Brian Teague)	
20	Fayetteville LID (Sarah Wrede)	
21	Green Roofs (Mark Boyer)	
22	Messiah College drainage features	
23	Rain Gardens	Rain Garden Exercise
24	Transportation BMPs (Zane Lewis)	
25	Rainwater collection	Rainwater collection exercise
26	Student presentations	