Project Description

Bucknell University owns a majority of the watershed of Miller Run, an impaired stream flowing through Bucknell's campus prior to its confluence with Limestone Run (locally known as Bull Run) just south of St. George St. As a result, we have a responsibility to sustain the health of natural ecosystems affected by our campus and an opportunity to demonstrate effective management approaches for managing and restoring streams in developed landscapes. In addition, the Campus Master Plan envisions the layout and interaction of campus facilities, which presents an occasion for us to improve the condition of Miller Run through better understanding of Bucknell's impact on the stream and proper stewardship. To this effect, the semester project for UNIV 298 will be to develop a restoration plan for Miller Run that will be used to inform the Campus Master Plan process as it moves forward with projects around campus.

A restoration plan contains an evaluation of the impacts on an ecosystem along with a set of potential prescriptions to reduce these impacts to restore (or at least to improve) ecological condition. To understand these impacts, we must study the physical, chemical, and biological condition of Miller Run in the context of its watershed geology and land uses. Human impacts on stream ecosystems vary with spatial scale from influences on processes occurring across an entire watershed to localized in-stream processes. Management can occur at any scale and can take on a variety of specific actions, depending on what improvements are sought through the management activity. In addition, restoration plans must contain realistic projects by defining desired outcomes through discussions with stakeholders, landowners, and local governments.

This project is designed to give you practical experience, similar to what you would do as a team working for a consulting firm hired by the university to design a restoration plan.

Throughout the semester, we will have several field trips and lab activities to collect data about Miller Run for developing the restoration plan. In addition, we will meet with groups involved in stream restoration and parties involved with the Campus Master Plan. The final products will include presentations to the campus in a public forum and a written report to be distributed to the appropriate groups around campus to become part of the Campus Master Plan.

Project Groups
1. Channel design (3) – channel cross-sections, longitudinal profile, determine proper channel dimensions, channel equilibrium, bedload sediment, tractive force, floodplain development
2. Stream hydrology (2) – hydrographs, watershed contributions, basin parameters (geology, land use, area), flood discharge & frequency, permanence of flow, rating curves, linkages to Bull Run
3. Stormwater & runoff issues (2) – map stormwater drainage system, estimate discharges from stormwater across basin, retention basins (space, design), runoff pumping & recycling
4. Water quality (2) – chemistry (salts, nutrients, metals), sediments, aquatic ecology, vegetation & riparian conditions
5. Economics & aesthetics (2) – cost for restoration, wetland & stormwater retention ponds, space for floodplain creation (loss of parking lots & fields), recreation & open/natural areas
6. Project managers (2) – storm watch, oversee storm sampling, participate in training, working knowledge of different aspects of study and basic methods, assist professors with project coordination, assembly of final documents, checking documents & products for consistency, executive summary web page of project (description, pictures, links to products)

Storm Team – project managers, Christine Kassab, hydrology, water quality, stormwater & runoff (for identification of specific contributions across the watershed – e.g., 7th Street, Moore Avenue/Loomis Street, North Branch pipe, South Branch, drainage pipes)

Date	Activity
15 Jan (lab)	Watershed walk-through, overview of the research project
22 Jan (lab)	Project Introduction, assembly of interested partners
29 Jan (lab)	Hydrology (field) – Buffalo Creek, Miller Run
05 Feb (lab)	Hydrologic modeling & land-use mapping in GIS (lab)
12 Feb (lab)	Field & lab work
26 Feb (lab)	Field & lab work
19 Mar (lab)	Field & lab work
16 Apr (lab)	Field & lab work
23 Apr (lab)	Project draft discussion, oral presentation rehearsal
28 Apr (class)	Final presentations

Status Reports
Periodically, each group will be expected to give status reports to the class (short oral presentations with figures and illustrations).

Parts of a Restoration Plan
   A. Executive summary
   B. Goal of restoration (or rehabilitation)
   C. Current condition and sources of impairment – watershed hydrology, channel pattern and processes, water quality, ecological condition
   D. Recommendations to reduce impairment or to improve conditions – management scenarios, suggestions for specific projects, cost estimates, plan & map with justification for specific projects (precise locations, types of structures, sites of retention ponds/wetlands)
   E. Challenges and opportunities for implementation – series of options (e.g., gravity pump, treated sewage, etc.)

Each group is going to be expected to contribute to each section listed above.

We strongly encourage each group to discuss data, graphs, and/or text on their component of the project with us throughout the semester.

This report should be structured into an integrated document and not 6 separate reports. Therefore, individual groups will have to work with other groups and project managers in order for this final document to take form. Your grade for the project will be based on the final report and not on drafts prepared separately by individual groups.

Grading
10% – Status reports
10% – Draft of final report
30% – Final presentations
50% – Final report

Due Dates
Complete draft of written report due Tuesday, 21 April. This draft will be discussed in lab on 23 April
Final presentations (28 Apr) – 50 minutes, 10 minutes per project group
Final written report (due 5 pm, 28 Apr)