

Ana Londono

EDDIE Module

Module name: Green Roofs

Expected dates of Implementation: 1/27/2023; 3/3/2-23; 4/24/2023.

### Course/Course Format:

The class meets three times a week for 50 minute lecture sessions. The class does not have a lab.

### Course Description:

Water availability has dictated human settlements and their development, not just in search of productive lands, but also to dealing with natural hazards. This class looks at the understanding of the different components of the hydrologic cycle, and how geomorphological and geological features modify water behavior. The ultimate goal of hydrology is to predict the occurrence, circulation and distribution of water, and how that impacts natural and anthropogenic systems.

### Course Context: Describe student and/or course level, e.g., lower or upper division, major course, etc. (e.g. "An introductory course for non-majors")

This is a 300-level, 16-week Surface Water Hydrology course for Environmental Sciences Majors.

### Course Goals and Topics (If available, extended version of learning goals and topics covered)

#### Course Learning objectives:

Students will become familiarized with the principles of the hydrologic cycle.

Understand concepts of effective precipitation, infiltration, runoff, streamflow and the unit hydrograph, and floods.

Become familiar with geomorphic processes within drainage basins, and how those influence surface water flow.

Understand how anthropogenic activities affect components of the hydrologic cycle.

**What learning objective(s) (content) are you planning to address in your course using the selected module materials?**

The activities from the EDDIE modules work well with concepts of the hydrologic cycle, especially those concerning relationships between precipitation-runoff-infiltration.

**Quantitative learning objective**

Determine the major precipitation events and determine the volume runoff under a specific ground cover

**Working with data learning objective**

Become familiar with large datasets, their advantages and disadvantages, and the interpretation of trends within the dataset.

Briefly describe the pedagogical techniques/strategies you plan to use to facilitate the module and reinforce the learning objectives you identified above.

- Lectures about each of the components of the hydrologic cycle, and relationships between infiltration and runoff
- Let students discover on their own websites where they can find information such as the one used in the modules. I am interested in students realizing the challenges of working with large datasets, and learning how to spot problems with data.

Are you planning on making any adaptations to the materials? If yes, please describe them here. If no, please indicate why. (*This will be important for the end when you make your final product, you will need to distinguish the modifications you made relative to the original*)

I am using the modules as is.

Do you think you will need to incorporate any supplemental materials with this module? If yes, please either describe what you are planning or include any materials you have already found.

After running the activity, I realized students needed more guidance on the use of Excel. I will probably create an activity where students work through different functions in excel before tackling the modules.

What assessments are you planning on using to measure student progress? If possible, describe, attach, or provide a link here.

I implemented the entire module for Green Roofs. I spaced the activities throughout the semester, with four weeks or so in between them. I used the modules by scaffolding them; this allowed me to offer feedback to students on each of the activities within the module. Activity C became a final project for them.

## Reflection Questions for after your Implementation

*(Think about what you would like to read about this activity if you came back to it in 2 years)*  
Suggestions for this section (not all required, and extras always welcome):

**Introductory Statement:** The summary should start with one line that captures the context in which the module was used. This should be followed by 2-5 sentences that highlight what was particularly interesting about this particular implementation. This could include the setting, schedule, student group, an exceptional success or unusual adaptation of materials

My course is a Surface Water Hydrology for Environmental Science majors. The class consists mostly of 50-minute lectures, with weekly assignments on the topics covered each week, and three major exams. I have implemented some readings from peer-reviewed journals, to have students become more familiarized with journal formats, and stay current with developments in the field. I have been wanting to implement activities that fostered analysis, and application on various concepts learned in class. This EDDIE module was a good step in that direction where students integrated real data, and applied the concepts learned in class to offer solutions. The students were excited with Activity C since they got to see how land use changes cause great variability in runoff in an area. I intend to modify the activity to add a comparison between urban and forested watersheds, and also include more activities that help them with data interpretation.

### How did it go? (What went well and why? What adjustments did you need make in real time and why?)

Overall the activity went well and students were surprised on how much variation there was in runoff and suspended solids based on the groundcover. There were some challenges for students especially in the first two activities. Most of the challenges came from students struggling with using the functions of Excel, not knowing how to paste data to Excel, or using functions like sorting, or other simple operations. The second challenge came from some students not understanding the meaning of trends, the use of  $R^2$  values, or the equation of a line.

To create a baseline before starting the module implementation, I am planning to create a couple of activities for using Excel functions, and creation of plots. The second activity will be geared towards examples using statistics, understanding trends, relationships between variables,  $R^2$ , etc.

## Student Outcomes (What did students take away? Where did students struggle the most?)

Based on the feedback I provided students, the takeaways concentrate on better understanding of Excel, and mywatershed softwares, appreciation for large datasets, and the work it takes to clean up data. Also, there was a better understanding of runoff-infiltration relationships, and the effects of high intensity events in water quality and quantity.

The struggles came mostly from using Excel, but there were some fundamental concepts in statistics that students struggle with.

## Future Use (Would you do this activity again? What suggestions do you have? What would you change?)

I will definitely implement this activity again. I will create a few activities and present some examples of use of excel, and statistics (trends,  $R^2$ , outliers, etc).

I had created an activity in the past when I first learned about mywatershed. The activity consisted on comparing urban and forested watersheds. In Saint Louis, there are small watersheds adjacent to each other, some with heavy urban development, and some that are mostly forests. Students liked the fact that they compared such different land use, and saw the positive/negative effects of implementing/removing green infrastructure on water quantity and quality.