Introduction to CEE 370

- Syllabus
- Book (Mihelcic & Zimmerman, 2nd edition)
- Website: [http://www.ecs.umass.edu/cee/reckhow/courses/370/](http://www.ecs.umass.edu/cee/reckhow/courses/370/)
  - Will also make some use of: Moodle, Gradescope and Piazza
- Labs: 5 in total
  - Streamflow is first
    - Location: Mill River on west edge of campus (adjacent to WET Center)
  - Teaching Assistants:
    - Soon-Mi Kim (soonmi@umass.edu), Monday & Tuesday labs
    - Savannah Wunderlich (swunderlich@umass.edu), Wednesday & Thursday labs
370 Lab

• This is our assigned lab room (Marston 24) as of this morning
• We may use an alternative lab room in Goessmann for labs #2-5

Lab #1 – measuring stream flow

• Measure volumetric flow rate (Q) and mean velocity (v) of a small stream
• How to do it?
  • Floating markers
  • Current meters
  • Chemical tracer dilution
Electromagnetic Current Meter Method

- Hach meter: Based on stream velocity at a specific point (depth and width) for a specified time frame (in seconds).

\[
Q_{\text{total}} = (A_1 \times v_1) + (A_2 \times v_2) + (A_3 \times v_3) + \cdots + (A_n \times v_n)
= Q_1 + Q_2 + Q_3 + \cdots + Q_n
\]

Electromagnetic sensors

- Hach FH950 flow meter

Images: [www.hach.com](http://www.hach.com)
Mill River Field Site

• Teams of 3
• Use tape measure to define cross sections
• Metal rod supports meter and sensor at the right depth
• Need appropriate footwear

Lab #1, Stream flow

• Before:
  • Attend information sessions held during normal lab periods
  • Make groups of 3-4.
  • Read and understand the lab session handout for next week’s lab exercise for all three methods.
• Day of:
  • Expect to step into the stream (knee-depth at most) so wear appropriate clothing (flip-flops, shorts).
  • Bring a notebook to record your data and take notes.
  • Leave on time to reach WET Center by 2:30 PM
  • If you don’t know the directions and/or need a ride, talk to your TA.
• Write-up
  • Prepare a write up (1 per group) as per technical report handout and the lab handout (last couple of pages)
  • Turn in your write-up as directed by TAs (1-2 weeks after lab)
How to dispose of Coke?

• To minimize environmental & human impact, I should
  A. Pour it into the shrubs in front of Marston Hall during dry weather
  B. Wait until there’s a heavy rain and then pour it into the shrubs
  C. Pour it down the sink
  D. Pour it in the toilet
  E. Throw the entire can’s contents into the trash

What’s in it?

• John Stith Pemberton’s original formulation
  • Cocoa leaves (37 g/L; including ~36 mg/L cocaine)
  • Cola nut (with Caffeine)

• Current formulation - largely unknown except:
  • Monosaccharides:
    • 84 g/L fructose
    • 68 g/L glucose
  • Caffeine: 89 mg/L (caffeine citrate)
  • Phosphoric acid (172 mg-P/L)
  • pH 2.3

Nutrition Facts

<table>
<thead>
<tr>
<th>Amount</th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>200</td>
</tr>
<tr>
<td>Fat</td>
<td>0 g</td>
</tr>
<tr>
<td>Sodium</td>
<td>40 mg</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>55 g</td>
</tr>
</tbody>
</table>

Not a significant source of other nutrients.
A. Land disposal during “dry” weather

- plume

From Waterloo Hydrogeologic

B. In wet weather – to the storm drain system

- Catch basin in front of Marston Hall
Catch Basins

- UMass design

UMass Amherst

- Stormwater system
UMass Amherst

• Stormwater system

NW segment

• Mill River
UMass Amherst outfalls

“Dry” weather (3 Sept 2019)
Mill River

- Complete Watershed
- Flows to Connecticut River

C & D: The sink & toilet solution

- Both go into the sanitary sewer system and on to the Amherst wastewater treatment plant
Amherst WWTP
Amherst WWTP

- layout

E: The trash can solution

- UMass office of waste management (https://www.umass.edu/wastemanagement/)
  - Integrated solid waste management approach
- The path
  - OWM trash packer truck to WRTF => transfer trailers to Holyoke transfer station => via rail to Southbridge MA landfill
Southbridge landfill – the final resting place?

- Capacity and contamination problems?

From: Worcester Telegram, Nov 5, 2015

Landfills and groundwater

- They all leak to some extent, especially unlined landfills
Next

• To next lecture

Handout

• Reading for next class:
  • M&Z: Chapter 1
    • Hardin’s “Tragedy of the Commons” Science, 13 Dec 1968 [pg 1243]

Also on website