# CE 365K Hydraulic Engineering Design, Spring 2015

## Review for First Exam

The material is classified according to *Bloom's Taxonomy of Educational Objectives*:

| Level | Title | Meaning |
|---|---|---|
| 1 | Knowledge | Definitions, facts, formulas |
| 2 | Comprehension | Explanation of definitions, formulas, problem solving procedures |
| 3 | Application | Know how to use a formula or procedure to solve simple problems |
| 4 | Analysis | Break down a complex problem and solve by steps |
| 5 | Synthesis | Derivation of basic formulas, design of new systems |
| 6 | Evaluation | Advantages and limitations of alternative approaches |

**Lectures**

| Lecture | Topic | Level |
|---|---|---|
| 1 | Introduction to Hydraulic Engineering Design | 2 |
| 2 | Flow in open channels.  Normal and critical depth | 4 |
| 3 | Flowmaster for open channel flow design | 3 |
| 4 | Orifices and weirs. Intensity, duration, frequency curve | 4 |
| 5 | Rational method | 5 |
| 6 | Stormwater inlet sizing | 4 |
| 7 | Geographic Information Systems | 2 |
| 8 | GIS and UT Campus.  Map projections | 2 |
| 9 | Culvert design | 3 |
| 10 | Landscape planning on UT Campus. Culvert design example | 3 |
| 11 | Stormwater Best Management Practices 1 (Dr Barrett) | 2 |
| 12 | Stormwater Best Management Practices 2 (Dr Barrett) | 2 |

**Readings**

| Topic | Level |
|---|---|
| Haested Chapter 1: Basic hydraulic principles | 4 |
| Haested Section 2.1 Design rainfall | 3 |
| Haested Section 2.3 Rational method | 5 |
| Haested Section 3.1 to 3.3 Design of inlets on grade | 4 |
| Haested Section 4.1 to 4.4 Culvert design | 3 |
| Austin Drainage Criteria Manual Section 2.4 Rational Method | 5 |
| Georeferencing and coordinate systems | 2 |

**Expected Knowledge**

1. For a rectangular channel with a specified depth of flow, be able to compute the corresponding flow area, wetted perimeter, hydraulic radius, discharge, critical depth, velocity, velocity head, specific energy, and Froude number.

2. Classify the flow as super or subcritical and understand what this means in terms of where the control on the water surface elevation comes from (upstream or downstream).
3. For a trapezoidal channel or for a circular pipe that is not flowing full, find the discharge when the depth is specified and the flow is uniform.
4. Describe how to use Flowmaster to solve problems related to the design of open channels (what can be considered as the variable to be solved for and how does this help in design?)
5. Determine the discharge over a weir for a given upstream water surface elevation.
6. Determine the discharge through an orifice for a given upstream water surface elevation
7. Apply the rational method to determine the design discharge from a section of roadway
8. For a given discharge in the gutter, determine the spread of water across a street.
9. For a given inlet length, determine the % of the flow in the gutter that the inlet will capture.
10. Describe the two types of control applicable at culverts and describe how CulvertMaster is used to design culverts.

You may bring a review sheet 8/5 x 11 inches with you with anything on it on both sides of the paper that you want.