CE 365K Hydraulic Engineering Design, Spring 2016
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	Basic hydraulic principles	2
2	Open channel design using FlowMaster	4
3	Gradually varied flow, orifices, weirs	4
4	Design storm rainfall	5
5	Introduction to hydrology	5
6	Runoff	4
7	HEC-HMS	3
8	Rational method	5
9	Inlet design	4
10	Storm sewer design (Dr Burgin)	3
11	Using StormCAD	3
12	Culvert design using Culvert Master	4
13	Geographic information systems	2
14	Newton's Laws, terrain analysis using GIS	2

Readings

Topic	Level
Haested Section 1.1 General flow characteristics	2
Haested Section 1.2 Energy	3
Haested Section 1.3 Friction losses	3
Haested Section 1.4 Pressure flow	2
Haested Section 1.5 Open-Channel flow	4
Haested Section 1.6 Orifices and weirs	4
Haested Section 1.7 Computer applications	2
Haested Section 1.8 FlowMaster	2
Haested Section 2.1 Rainfall	4
Haested Section 2.2 Rainfall Abstractions and runoff volume	5
Haested Section 2.3 Computing peak runoff flow rate	5
Haested Section 2.4 Computing hydrographs	4
Haested Section 3.1 Inlet design overview	2

Haested Section 3.2 Gutter sections on grade	4
Haested Section 3.3 Inlets on grade	3
Haested Section 3.4 Inlets in sag	2
Haested Section 3.5 Inlet design overview	2
Haested Section 3.6 Gradually varied flow	2
Haested Section 3.7 Mixed flow profiles	2
Haested Section 3.8 Storm sewer applications	2
Haested Section 3.9 StormCAD	2
Haested Section 4.1 Culvert systems	2
Haested Section 4.2 Outlet control hydraulics	4
Haested Section 4.3 Inlet control hydraulics	3
Haested Section 4.4 Culvert Master	2
Austin Drainage Criteria Manual Section 1.2.2 Drainage Policy	2
Austin Drainage Criteria Manual Section 2.4 Rational Method	5
Austin Drainage Criteria Manual Section 2.5.2, 2.5.3 SCS method	3
ArcGIS What are Map Projections	2
ArcGIS Hydrology tools	2

Expected Knowledge

1. For a rectangular or trapezoidal 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. 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?)
4. Determine the discharge over a weir for a given upstream water surface elevation.
5. Determine the discharge through an orifice for a given upstream water surface elevation
6. Given an equation for intensity-duration-frequency rainfall, determine the intensity and depth for a given duration and frequency.
7. Given a rainfall depth and duration, determine a design storm hyetograph using the SCS method.
8. Apply the rational method to determine the design discharge from a small drainage area.
9. Determine the depth of direct runoff for a storm using the NRCS curve number method.
10. Know how to set up a simple HEC-HMS model for a single basin with a single meteorology representation.
11. For a given discharge in the gutter, determine the spread of water across a street.
12. For a given inlet length, determine the % of the flow in the gutter that the inlet will capture, assuming inlet on grade conditions.
13. Design a simple storm sewer system with a small set of drainage areas and pipes.
14. Describe the two types of control applicable at culverts and describe how CulvertMaster is used to design culvert

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.