



CE 3354 ENGINEERING HYDROLOGY

INTRODUCTION TO HEC-HMS



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➤ History

- Evolved from HEC-1 as part of “new-generation” software circa 1990
- Integrated user interface to speed up data input and enhance output interpretation

➤ HMS is a complex and sophisticated tool

- Intended to be used by a knowledgeable and skilled operator
- Knowledge and skill increase with use

HEC-HMS

- Data management
 - Graphical User Interface (GUI)
 - Multiple input files
 - Multiple output files
 - Time-series in HEC-DSS

- All files arranged in a “Project”
 - Paths to individual files
 - Can e-mail entire project folders and have them run elsewhere

HEC-HMS

- Conceptualizes precipitation, watershed interaction, and runoff into major elements
 - Meteorological model
 - Raingage specifications and assignment to different sub-basins
 - Time-series models
 - Supply input hyetographs
 - Supply observed hydrographs
 - Simulation control
 - Supply instructions of what, when, how to simulate

HEC-HMS

- Conceptualization:
 - Basin and sub-basin description
 - Supply how the system components are interconnected
 - Loss model
 - Supply how rainfall is converted into excess rainfall
 - Transformation model
 - Supply how the excess rainfall is redistributed in time and moved to the outlet

APPLICATIONS

- HEC-HMS is a Hydrologic Model
 - Peak Flows
 - Hydrographs
 - Hydrograph Routing

HEC-HMS

- Precipitation
- Abstractions
 - Fraction of precipitation that does not contribute to runoff (and ultimately discharge)
- Transformation
 - Temporal redistribution of precipitation over a basin until flow is in a hydraulic element
- Routing
 - Watershed routing
 - Stream (Channel) routing
 - Reservoir (Storage) routing

HEC-HMS EXAMPLE-1

- Minimal model
 - SCS Type Storm
 - 640 acre watershed – no process models; completely converts rainfall into runoff

HEC-HMS EXAMPLE-2

- Ash Creek Watershed
 - Delineate and measure watershed
 - Historical rainfall and discharge use R to prepare the data for use in HEC-HMS
 - Use the SCS unit hydrograph transform model – later in course will explain how to parameterize
 - Examine various loss models
 - Examine inclusion of ET and canopy/depression storage