

Auxiliary Concept: Hydrologic Systems


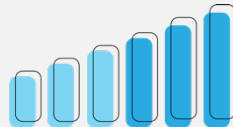
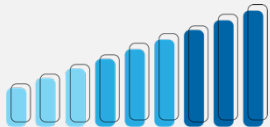
Engineering Literacy Dimension: Engineering Knowledge

Domain: Engineering Technical Applications

Overview: *Hydrologic Systems* encompass all of the interrelated physical structures and devices as well as the natural environment (including precipitation, evaporation, streamflow, surface runoff, groundwater movement, etc.) that effect, and help manage, the movement, distribution, and properties of water. This also includes knowledge of the fundamental principles of hydrology necessary to analyze and evaluate environmental conditions and determine the characteristics of hydrologic systems needed to meet design objectives. This concept is important to *Engineering Literacy*, as it enables one to leverage the knowledge of runoff, stream flow, soil moisture, and ground water flow to innovate tools and methods in water distribution and collection necessary for sustaining, as well as enhancing, a community's living conditions and economy. For example, methods of data collection and error analysis associated with water in hydrology and water resources, assist in the development, construction, and application of systems necessary to manage a community's water resources.

Performance Goal for High School Learners

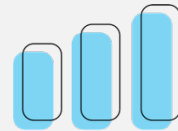
I can, when appropriate, draw upon the knowledge of Hydrologic Systems content and practices, such as (a) *hydrology principles*, (b) *water distribution and collection systems*, (c) *watershed analysis processes*, (d) *open channel systems*, (e) *closed channel systems (pressurized conduits)*, (f) *pumping stations*, and (g) *hydrologic field tests and codes*, to analyze/model the flow of water in and out of a system, using the appropriate mathematical equations and conventions, in order to solve problems in a manner that is analytical, predictive, repeatable, and practical.

	 Basic	 Proficient	 Advanced
HYDROLOGY PRINCIPLES	I can define hydrology and hydraulics, describing the basic methods and applications of hydrologic and hydraulics analysis.	I can explain the factors determining the flow of a fluid (e.g. density of water, gravity, depth of the body of liquid, etc.) and the force of the flow with Reynolds number.	I can analyze and model the flow of water in and out of a system, using mathematical equations and a hydrologic cycle.
WATER DISTRIBUTION & COLLECTION SYSTEMS	I can define water supply systems, describing its basic functions.	I can explain the basic components and process of water supply systems.	I can analyze the design criteria for a water supply system to meet the water quality standards required for human consumption.
WATERSHED ANALYSIS	I can define watersheds, identifying a watershed on a topographic map.	I can explain how a watershed can be generated and discuss what factors can influence on the process.	I can analyze a watershed, considering the goals and procedures of watershed analysis, to solve a design problem calling for a hydrologic system.

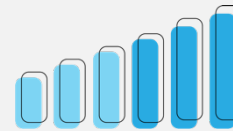
Auxiliary Concept: Hydrologic Systems Cont.

Performance Goal for High School Learners

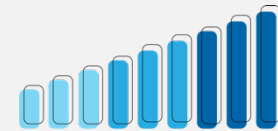
I can, when appropriate, draw upon the knowledge of Hydrologic Systems content and practices, such as (a) *hydrology principles*, (b) *water distribution and collection systems*, (c) *watershed analysis processes*, (d) *open channel systems*, (e) *closed channel systems (pressurized conduits)*, (f) *pumping stations*, and (g) *hydrologic field tests and codes*, to analyze/model the flow of water in and out of a system, using the appropriate mathematical equations and conventions, in order to solve problems in a manner that is analytical, predictive, repeatable, and practical.



Basic



Proficient



Advanced

OPEN CHANNEL SYSTEMS

I can define open-channel flow, differentiate it from closed-conduit flow.

I can explain the classification of open-channel flow (steady vs. unsteady; uniform vs. varied; continuous vs. discontinuous, etc.).

I can explain the behavior of open channel flow in terms of viscosity, gravity, inertia, surface tension, etc., using mathematical equations.

CLOSED CHANNEL SYSTEMS (PRESSURIZED)

I can define closed-conduit flow, differentiate it from open-channel flow.

I can explain the classification of closed conduit flow (laminar, turbulent).

I can analyze the behavior of closed-conduit flow in terms of viscosity, gravity, inertia, etc., using mathematical equations.

PUMPING STATIONS

I can define pumping stations and describe its basic applications (e.g. water supply, hydraulic power system, land drainage, sewage, etc.).

I can explain the functions of a pumping station for each application.

I can analyze what roles a pumping station would play in a hydrologic system to be designed.

HYDRAULIC FIELD TESTS & CODES

I can describe the different field tests and codes in a hydraulic testing system.

I can classify the necessary tests to use and read the codes needed in a hydraulic system.

I can plan and execute field tests and use the codes needed throughout the process of solving a design problem calling for a hydrologic system.