

Applied Hydraulics

Course Overview

This course is designed to acquaint students with the hydraulics involved in water treatment, storage and distribution, and the math that applies to hydraulic principles. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the Applied Hydraulics course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

Applied Hydraulics (2.0 CEUs)

- Density and Specific Gravity
- Pressure and Force
- Piezometric Surface and Hydraulic Grade Line
- Head
- Head Loss
- Pumping Problems
- Flow Rate Problems
- Thrust Control

Required Texts

Textbook: *Basic Science Concepts and Applications*, Principles and Practices of Water Supply Operations series

Edition: Fourth Edition

Author: Nicholas G. Pizzi

ISBN: 1-58321-778-9

Educational Objectives

- To provide students with an overview of density and specific gravity and the mathematical concepts that apply
- To provide students with an overview of pressure and force, and the mathematical concepts that apply
- To acquaint students with the principles of piezometric surface and hydraulic grade lines



Applied Hydraulics

- To acquaint students with head, head loss, and the mathematical applications that apply
- To acquaint students with pumps and calculating their efficiency
- To acquaint students with flow rate problems encountered in the water treatment and distribution process
- To acquaint students with thrust, thrust control, and the mathematical concepts that apply

Evaluation

Students will be graded on their performance on each lesson quiz, and their course participation. Unless each unit is completed, the student will not be permitted to advance to the next lesson, and the student will not be awarded credit for completion until all assignments, quizzes and lectures are completed. Please contact our office with any questions.

Support

Students can contact our student support staff with any course-related, content-related, or technology-related inquiries. Our office hours are Monday-Thursday, 9-5 CT, and Friday 9-12 CT.

Contact Info:

Phone Number: (661) 874-1655

Email Inquiries: Info@americanwatercollege.org

Additionally, students are encouraged to contact their professor directly with any questions or comments.



Applied Hydraulics

Lesson 1 – Density and Specific Gravity

Summary of This Lesson

This lesson will provide an overview of the methods of calculating density and specific gravity and how they are used in calculations in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of calculating density and specific gravity
- Explain how density and specific gravity are used in calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 1, "Density and Specific Gravity," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 1
- Answer Review Questions
- Complete the quiz for Lesson 1



Applied Hydraulics

Lesson 2 – Pressure and Force

Summary of This Lesson

This lesson will provide an overview of the methods of pressure and force and how they are used in calculations in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of pressure and force
- Explain how pressure and force are used in calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 2, "Pressure and Force," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 2
- Answer Review Questions
- Complete the quiz for Lesson 2



Applied Hydraulics

Lesson 3 – Piezometric Surface and Hydraulic Grade Line

Summary of This Lesson

This lesson will provide an overview of the methods of calculating piezometric surface and hydraulic grade line and how they are used in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of calculating piezometric surface and hydraulic grade line
- Explain how piezometric surface and hydraulic grade lines are used in calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 3, "Piezometric Surface and Hydraulic Grade Line," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 3
- Answer Review Questions
- Complete the quiz for Lesson 3



Applied Hydraulics

Lesson 4 – Head

Summary of This Lesson

This lesson will provide an overview of the methods of calculating hydraulic head and how it is used in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of calculating hydraulic head
- Explain how hydraulic head is used in calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 4, "Head," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 4
- Answer Review Questions
- Complete the quiz for Lesson 4



Applied Hydraulics

Lesson 5– Head Loss

Summary of This Lesson

This lesson will provide an overview of the methods used to calculate head loss and how the data is used in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods used to calculate head loss
- Explain how head loss data is used in calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 5, "Head Loss," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 5
- Answer Review Questions
- Complete the quiz for Lesson 5



Applied Hydraulics

Lesson 6– Pumping Problems

Summary of This Lesson

This lesson will provide an overview of the methods of performing pumping calculations, including determining pumping rates, pump heads, horsepower, and efficiency, how to read pump curves, and the uses of pump calculations in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of performing pumping calculations
 - determining pumping rates
 - pump heads
 - horsepower
 - efficiency
- Explain how to read pump curves
- Explain the uses of pump calculations in water system operations

Assignments for This Lesson

- Read Hydraulics 6, "Pumping Problems," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 6
- Answer Review Questions
- Complete the quiz for Lesson 6



Applied Hydraulics

Lesson 7 – Flow Rate Problems

Summary of This Lesson

This lesson will provide an overview of the methods used to perform flow rate calculations for pipes and channels, how commonly used flow measuring devices operate and are read, and how flow rate calculations are used in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods used to perform flow rate calculations for pipes and channels
- Explain how commonly used flow measuring devices operate and are read
- Explain how flow rate calculations are used in water system operations

Assignments for This Lesson

- Read Hydraulics 7, "Flow Rate Problems," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 7
- Answer Review Questions
- Complete the quiz for Lesson 7



Applied Hydraulics

Lesson 8– Thrust Control

Summary of This Lesson

This lesson will provide an overview of the methods of performing thrust control calculations, and how calculations of thrust are used in water system operations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the methods of performing thrust control calculations
- Explain how calculations of thrust are used in water system operations

Assignments for This Lesson

- Read Hydraulics 8, "Thrust Control," in *Basic Science Concepts and Applications*
- Watch the video lecture for Lesson 8
- Answer Review Questions
- Complete the quiz for Lesson 8

