

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

GEOHYDROLOGY
CET 2140

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

Date Revised: Spring
02

Catalog Course Description:

This course covers the basic laws and properties of incompressible fluids; introduction to the hydrological cycle; precipitation measurement and distribution; stream flow measurement and unit hydrograph; well drilling and ground water flow analysis and application of hydrologic and hydraulic principles to design of urban drainage systems.

Entry Level Standards:

Students entering this course should have good note-taking and study skills and the prerequisites.

Prerequisites:

MATH 1730 or 1731

Textbook(s) and Other Reference Materials Basic to the Course:

Fetter, C. W., *Applied Hydrogeology*, Macmillan, New York

I. Week/Unit/Topic Basis:

Week	Topic
1	Lecture: Introduction to fluid flow, fluid classification and characteristics. Lab: Introduction
2	Lecture: Hydrostatic pressure and general fluid flow design factors. Lab: Hydrostatic/head fluid pressure
3	Lecture: Continuity of fluid flow. Exam 1. Lab: Manometry
4	Lecture: Introduction to hydrogeology and the hydrologic cycle. Lab: Flow continuity
5	Lecture: Evaporation and Precipitation. Lab: Pipe friction
6	Lecture: Runoff and stream flow. Lab: Fitting Losses
7	Lecture: Ground water. Exam 2.

- Lab: Series/parallel fluid flow
- 8 Lecture: Ground-water flow.
Lab: Open channel flow
- 9 Lecture: Ground-water flow to wells.
Lab: Flow measurement
- 10 Lecture: Regional ground-water flow.
Lab: Pump characteristics
- 11 Lecture: Geology of ground-water occurrence. Exam 3.
Lab: Geophysical surface investigations
- 12 Lecture: Water chemistry.
Lab: Well drilling
- 13 Lecture: Ground-water contamination.
Lab: Well logging
- 14 Lecture: Ground-water development and management.
Lab: Stream flow measurements
- 15 Lecture: Field methods.
Lab: Review
- 16 Final Exam.

II. Course Objectives*:

- A. Understand the hydrologic cycle and the hydrologic equation. I, II, & VI
- B. Use standard techniques to determine the quantity and distribution of surface runoff. I, II, & VI
- C. Understand the use of the Rational Method to describe the relationship between rainfall and runoff. I, II, & VI
- D. Describe the occurrence of soil moisture and ground-water flow. I, II, & VI
- E. Define the basic concepts and laws governing ground-water development and management. I, II, & VI
- F. Apply appropriate field methods to determine ground-water characteristics and contamination. I, II, III, IV, & VI
- G. Communicate and work effectively as a technician. II, III

*Roman numerals after course objectives reference goals of the CET program.

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions which challenge the students' ability to think creatively.
Communication Outcome, Problem Solving and Decision Making Outcome, Active Learning Strategy

2. Participate in site visits and invited guest lecturers from the engineering community to help in the transition from the classroom and laboratory to work. *Transitional Strategy, Communication Outcome, Active Learning Strategy*
3. Work in teams to conduct laboratory tests and solve special problems to foster interpersonal skills of teamwork . Frequently this leads to development and refinement of leadership skills and the ability to express ones' thoughts and ideas and seek, through negotiation, consensus of the team. *Communication Outcome, Personal Development Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Informational Literacy Outcome, Active Learning Strategy*
4. Prepare professional level reports describing standard soil laboratory tests requiring mathematical analysis as well as written communication to advance the basic skills of writing and mathematics. *Communication Outcome, Problem Solving and Decision Making Outcome, Informational Literacy Outcome, Active Learning Strategy*
5. Use computers to process information obtained through laboratory tests and problem assignments to enhance information literacy skills. Spreadsheets are used to record laboratory data, to perform data reduction and to prepare logical tabular and graphical presentations of the laboratory results. Word processing software is used to prepare reports and the Internet is used for special assignments. *Technological Literacy Outcome, Numerical Literacy Outcome, Informational Literacy Outcome*
6. Discuss the importance of such personal qualities as ethics and personal responsibility in school and in the workplace. *Personal Development Outcome*

*Strategies and outcomes listed after instructional processes reference Pellissippi State' s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Discuss the basic concepts of fluid flow. A
2. Explain hydrostatic pressure. A
3. Discuss the use of Bourdon gauges and manometers. A
4. Discuss the classifications and characteristics of pumps. A
5. Discuss the relationship between pipe size, velocity, flow rate, and pressure. A
6. Discuss the effect of friction and pipe length on fluid pressure. A
7. Explain the hydrologic cycle. B
8. Explain the water balance equation. B
9. Discuss the methods of determining rainfall intensity and evaporation. B
10. Calculate storm-water runoff quantity. B
11. Discuss the stream flow characteristics and methods of measuring stream velocities and volume of discharge. B

12. Discuss soil percolation and moisture occurrence. C
13. Discuss soil flow nets. C
14. Discuss aquifer management techniques. D
15. Discuss water quality standards. D
16. Discuss sources of ground-water contamination. D
17. Discuss methods of ground-water restoration. D
18. Discuss fracture trace methods of analysis. E
19. Discuss surficial methods of geophysical investigation. E
20. Discuss well logging procedures. E & F
21. Discuss hydrogeologic site evaluations. E & F
22. Produce project reports. E & F

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Four examinations will be given. The examinations may consist of problems, essay, short answer, multiple choice, true-false, or a combination of all of these. One examination may be made up if the student has a valid excuse for missing the examination. The examination must be made up within one week.

The four examinations account for 60 percent of the final grade.

B. Laboratory Expectations:

A number of laboratory tests are scheduled covering the topics listed above. A laboratory journal will be kept by each student and reports prepared for all laboratory tests in accordance with professional report standards specified by the instructor in the handout "Laboratory Instructions". The student will be graded on laboratory technique, the journal and the reports. Reports will be graded for technical content but they must meet acceptable grammar standards or they will be returned to the student to be redone.

A short quiz will be given at the start of each laboratory period on the procedure for the test being conducted that day. The score on the quiz will be added to the grade of the report. Laboratory training is important for Civil Engineering Technicians; therefore, it is required that all students complete all laboratory assignments to receive a passing grade in the course. The laboratory accounts for 30 percent of the course grade.

C. Field Work:

Quizzes, Homework, and Instructor Evaluation:

Unscheduled short quizzes may be given covering recent class lecture material. Quizzes cannot be made up.

Homework will be assigned regularly.

Quizzes, homework, instructor evaluation will account for ten percent.

D. Other Evaluation Methods:

N/A

E. Grading Scale:

90-100	A
86-89	B+
80-85	B
76-79	C+
70-75	C
60-69	D
0-59	F

VI. Policies:

Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.