SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title:	WATER WELLS & PUMPS
Code No.:	WTR 313-5
Program:	WATER RESOURCES ENGINEERING TECHNOLOGY
Semester:	VI
Date:	APRIL 1988
Author:	SUBHASH C. VERMA

New; Revision:

APPROVED: Chairperson Date kf^rJ i^fsfj

WATER RESOURCES
WTR 313-5
WATER WELLS & PUMPS

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OBJECTIVES;

At the end of the semester, the student should be able to:

1. Relate the geology of an area to ground water resources development.
2. Compare various well drilling techniques.
3. Select diameter of well and casing.
4. Make a sieve analysis of the aquifer material and plot particle size distribution curve.
5. Design the intake protion, i.e., screen and gravel pack.
6. Identify factors influencing the choice of method for well development.
7. Perform constant rate pumping test in the field and observe drawdown data.
8. Calculate aquifer constants viz. storage coefficient and transmissibility based on time and distance drawdown curves.
9. Select the type and size of pump for a given situation.
10. Make computations of operating head and selection of pump.
11. Identify factors affecting pump and well performance.
12. Calculate wire to water efficiency in the system.
13. Identify concepts, definitions and computations of system efficiency.
14. Recognize and use concepts in designing components of new systems and improving existing systems.
15. Design well and pumping system for small communities.

EVALUATION;

Laboratory Exercises	25%
Short Tests	35%
Final Examination	40%

GRADING:

A+ = 90-100%
A = 80-89%
B = 70-79%
C = 60-69%

A passing grade will be based on a minimum composite grading of 60%. Students obtaining a composite grading of 55-59% may be allowed to complete a supplementary examination.

FIELD TRIPS;

Wherever possible field trips will be made to observe well drilling, existing well and pumping systems. Municipal or Industrial Water treatment plants and water distribution systems.

TEXTBOOK(S);

Johnson, Edward E, Inc., Ground Water and Wells, Johnson Division, UOP Inc., 1986.

REFERENCES;

Heloveg, Otto J., Scott, V.H., and Scalmanini, J.C., Improving Well and Pump Efficiency, American Water Words Association, 1983.

Karassik, I.J., Krutzsch, W.C., Fraser, W.H., and Messina, J.P., Pump Handbook, McGraw-Hill Book Company, Toronto, 1976.

Flygt, Production Education Manual, Canada.

Environment Protection Agency, Manual of Well Water Construction Practices, National Technical Information Service, Springfield, Virginia.

Todd, David K., Groundwater Hydrology, Second Edition. John Wiley & Sons, Toronto, 1980.

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COURSE OUTLINE:

TOPIC	NO. OF WEEKS
1. Well Drilling - cable-tool percussion method - hydraulic rotary drilling - reverse rotary drilling - driven wells	2
2. Water-Well Design - well screen design - gravel-pack design - sanitary protection	3
3. Well Hydraulics - pump testing - type of pump tests - theoretical formulations	3
4. Developing Wells - mechanical surging - hydraulic surging - overpumping and backwashing	1
5. Pumps - kinds of pumps and their uses - positive displacement pumps - centrifugal pumps - submersible pumps - pump selection - pump characteristic curves	3
6. Analysis of Well and Pumping Systems - concepts of efficiency - well and pumping plant testing and analysis - evaluating wells - evaluating pumps - economics of improving efficiency	3