

HYDROLOGY and WATER RESOURCES

Lecture:: TR 9:10-10:25
Lab: W 1:00-3:50

Room: Bracy 127

Instructor: Mark McNaught

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Hours MWF 9:00-10:00
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COURSE DESCRIPTION

A study of water properties, occurrence, distribution, and movement and their relationship with the environment within each phase of the hydrological cycle. The course also examines water quantity and quality issues, and water management policies.

APPROACH

This class will use mix of lecture and problem based approaches. A major part of the course will be lab and field exercises will focus on the hydrology of the greater Alliance area. These exercises will involve the collection, analysis, and interpretation of data, and the presentation of results. Lab reports will count as a major part of your grade. You will be introduced to techniques that are used in addressing environmental problems such as flooding, water supplies, and groundwater contamination.

LEARNING OUTCOMES

On completion of this course students should be able to:

1. describe the movement of water through the hydrologic cycle and the factors that affect its flow.
2. measure the flow of water at various points of the hydrologic cycle.
3. collect data in the field, quantitatively analyze results, and reach sound conclusions.
4. evaluate challenges society faces in using water resources
5. present results of scientific work orally and in writing.

EQUIPMENT: Pencil, Ruler, Calculator, Clothing appropriate for field work, Sunscreen, Bug repellent

TEXTBOOK: None. Reading assignments will mainly come from government documents (see reading list).

GRADING:

Midterm Exam	20%
Final Exam	25%
Lab Exercises	45%
Water Resource Presentations	10 %
Total	100%

Late Assignments will be docked a 10% penalty for each day late.

ATTENDANCE

Students are expected to attend all classes. Students who miss more than three classes may be penalized. Make up exams will only be given for officially excused absences. Many lab and field exercise will be impossible to make up.

ACADEMIC HONESTY

Students are expected to obey the conduct guidelines and rules of the University of Mount Union (see your student handbook) with respect to academic honesty and preparation of work for this class.

Any student with a documented disability needing academic accommodations is requested to speak with Student Accessibility Services (Room 113 Hoover-Price Campus Center) and the instructor, as early in the semester as possible. All discussions will remain confidential

Tentative Schedule (Changes may be made based on weather conditions)

Date	Week	Topic	Reading *
Aug 30 31 Sept 1	1	Introduction to the Hydrologic Cycle Reading Topographic Maps Geology	# 1 #2 #3
6 7 8	2	Geologic Materials and Geologic Maps FT Local Geology Precipitation	#4
13 14 15	3	Spreadsheets Precipitation Analysis Report Prep.	
20 21 22	4	Evapotranspiration Properties of Geologic Materials Report Prep	
27 28 29	5	Soils and Infiltration FT Infiltration measurement Report Prep	#5 #6
Oct. 4 5 6	6	Drainage Basins Mahoning River Basin Analysis TBA	#7
11 12 13	7	Stream Flow FT Stream Gaging Report Prep	#8:
18 19 20	8	Water Pollution FT Water Chemistry MIDTERM EXAM	#12
25 26 27	9	Runoff and Flooding Flood Plain Mapping Hydrograph Calculation	#9, #10 #11
Nov.1 2 3	10	Introduction to Groundwater Ground Water Model and Darcy's Law Aquifers Properties	#13; #14: pp. 1-27 #14: 28-63
8 9 10	11	Flow to Wells FT Aquifer analysis Report Prep	
15 16 17	12	Groundwater Flow Ground Water Mapping and Modeling Groundwater Models	
22 23, 24	13	Contaminate Hydrogeology Thanksgiving Break	#14: pp. 64-77; #15
29 30 Dec 1	14	Contaminate Hydrogeology Exercise Contaminate Hydrogeology Exercise Contaminate Hydrogeology Exercise	
6 7 8		Water Resource Presentations Contaminate Hydrology Water Resource Presentations	
15		Final Exam (8:00 AM Thur. Dec. 15th)	

* # 's refer to papers on reading list. Additional Reading assignments may be assigned.

Reading List

1. Brown, L.C., 1994, Ohio's Hydrologic Cycle, Ohio State University Extension Fact Sheet AEX-461-94. <http://ohioline.osu.edu/aex-fact/0461.html>
2. Topographic maps web page, parts I-VIII: <http://raider.mountunion.edu/~mcnaugma/Topographic%20Maps/topomapindexpage.htm>
3. Coogan, A.H., 1996, Ohio's Surface Rocks and Sediments, in Feldmann and Hackathorn, eds., **Fossils of Ohio**, Ohio division of Geological Survey Bulletin 70. http://www.dnr.state.oh.us/Portals/10/pdf/OH_SurfaceRocks_Sediments.pdf

Hansen, M.C., 1997, Ice Age Ohio, Ohio Geological Survey Educational Leaflet no. 7. <http://www.ohiodnr.com/Portals/10/pdf/EL/el07.pdf>
4. Point Precipitation Measurements web page <http://www.srh.noaa.gov/abr/c/?n=map>
5. ODNR Division of Soil and Water Resources - Introduction to Soils (http://www.dnr.state.oh.us/H_Nav2/Soils/OhiosSoils/IntroductiontoSoils/tabid/17818/Default.aspx)

ODNR Division of Soil and Water Resources - Soil Regions (<http://www.dnr.state.oh.us/soilandwater/soils/SoilRegions/tabid/9073/Default.aspx>)

ODNR Division of Soil and Water Resources - Pictures of Soil Types (http://www.dnr.state.oh.us/H_Nav2/Soils/OhiosSoils/PicturesofSoilTypes/tabid/17831/Default.aspx)
6. _____, 2006 **Pennsylvania Stormwater Best Management Practices Manual**. <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305> . Read Appendix C
7. Mount, J. F., 1995, California Rivers and Streams: The Conflict Between Fluvial Process and Land Use, University of California Press. Electronic Version of the book can be reached through our library catalog . Read Chapter 4.
8. Michaud, J.P. 1991, A citizen's Guide to Understanding and Monitoring Lakes and Streams, Washington State Department of Ecology, <http://www.ecy.wa.gov/pubs/94149.pdf>
9. _____, 2005, Ohio Floodplain Management Handbook, Ohio Department of Natural Resources, Division of Water. http://www.dnr.state.oh.us/Portals/7/floodpln/oh_floodplain_handbook.pdf. Read Chapters 1, 2, 4.
10. _____, 1981, **Guidelines for determining Flood Flow Frequency**, Interagency Advisory Committee on Water Data Bulletin 178. http://water.usgs.gov/osw/bulletin17b/bulletin_17B.html. Pages to be read to be determined.
11. _____, 1986, **Urban Hydrology for Small Watersheds**, Natural Resources Conservation Service TR-55. <http://www.cpsc.org/reference/tr55.pdf> Read chapters 1-4.
12. _____, 1997, Volunteer Stream Monitoring: A Methods Manual, US EPA, <http://www.epa.gov/volunteer/stream/stream.pdf> . Read chapters 2 and 5.
13. Winter, T.C., Harvey, J.W., Franke, O.L., Alley, W.M., 2006, Ground Water and Surface Water a Single Resource, US Geological Survey Circular 1139. <http://pubs.usgs.gov/circ/circ1139/#pdf>
14. Heath, R. C., (2004) *Basic Ground-Water Hydrology*, USGS Water Supply Paper 2220, <http://pubs.er.usgs.gov/usgspubs/wsp/wsp2220>
15. _____, 2006, **Volatile Organic Compounds in the Nation's Groundwater and Drinking-Water Supply Wells**, USGS Circular 1292, <http://pubs.usgs.gov/circ/circ1292/>. Read Chapters 2,3,4,5.