EOS 656/EVPP 652 - **The Hydrosphere;** Credits: 3
4:30 pm - 7:10 pm Tuesday Innovation Hall 131
Jan 23, 2012 - May 16, 2012

Syllabus

Overview: Components and transfer processes within the hydrosphere, which consists of aqueous envelope of Earth, including oceans, lakes, rivers, snow, ice, glaciers, soil moisture, groundwater, and atmospheric water vapor. Offers understanding of various components of the hydrosphere, spatial and temporal distributions, physics of transfer processes for redistribution, and appreciation of water's role in sustaining life and influencing global and regional energy and mass balance.

Prerequisites: Two semesters of calculus, preferably partial differential equations; or permission of instructor.

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Office Hours: by appointment
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Website: http://mason.gmu.edu/~phouser/hydrosphere

Required text: Dingman, S. L., Physical Hydrology, 2nd Edition,Waveland Press, Inc..

Procedure: Material will be covered by lectures, not necessarily restricted to the text/supplemental and handouts. Students are expected to read the text and other assignments thoroughly prior to the lecture.

Performance: Material covered on the final exam will include handouts, lecture notes and outside readings.

Evaluation: All work must be your own. A grade of "0" will be assigned for any work which is clearly not your own or cheating of any type.

Homework	20 %
Paper Presentation	10%
Final Exam	40%
Term Paper	30%

Homework assignments: All assignments should be done neatly and professionally. Pages must be numbered and stapled. The problem should be defined, diagrammed (if appropriate), and the solution should be developed in a step-by-step procedure. Spreadsheet answers can be printed out and annotated. The final solution should be reported to the appropriate significant figures and underlined. You are encouraged to work together in study groups; however, identical (copied) homework will be awarded a grade of zero (0). Incorrect

homework may be neatly reworked on a separate sheet of paper and resubmitted for re-evaluation and partial credit.

Team Project: The project will consist of a modeling or data analysis exercise to investigate a well-posed hydrological question. Models may be written by the 2-student team, or an existing model may be selected for the investigation. Project deliverables will consist of: 1. A brief project proposal; 2. A short (5-10 pages) written report in standard scientific format; and 3. a 20-minute oral presentation. Here are a few ideas:

- The transmission of dam-induced stage changes in the Lower Colorado River: Data Interpretation: Stage data from different parts of LCR over tens to more than 100 km will be collected and analyzed to determine how a dam-induced flood travels through the LCR.
- The transmission of dam-induced stage changes in the Lower Colorado River: Modeling. Dam-induced stage variations will be modeled using kinematic wave or diffusive wave approximations. The model will be driven by upstream data.
- Measurement of discharge and stage changes in a local River. Students will deploy pressure transducers along different parts of the river to monitor dam-induced stage fluctuations.
- Measurement of moisture changes in the riparian zone of the Lower Colorado River due to dam-induced stage changes. This project will consist of a historical assessment of the LCR and how floods (natural and managed) have altered its course, if any.
- A 'backward' systems dynamics hydrologic model for a local creek/river.
- Discharge data from a local creek/river will be analyzed following Kirchner (Water Resources Research, 2009)
- A 'backward' systems dynamics hydrologic model for local springs/creek.
- Is Virginia getting warmer? Focus on extreme temperatures
- Students will collect ground and air temperature archives from weather stations across the state and delineate trends for number of days above 90 F or some other threshold, if any.
- Long-term (decadal) discharge variations in undammed Virginia rivers. Historical discharge data from undammed rivers or those little affected by dams will be analyzed.

Other project ideas:

http://www.ce.utexas.edu/prof/maidment/gradhydro99/termproj.html
http://www.ce.utexas.edu/prof/maidment/giswr2010/docs/termpaperlibrary.htm

Paper Presentation: Each student will be required to present a relevant research paper or topic at the start of one of the class sessions. The 15 minute presentation should be generally relevant (but not redundant) to the topic covered during that class session. Grading will be based on (1) relevancy and creativity of chosen paper/topic, (2) quality of presentation and visuals, (3) responses to questions and discussion. ***Any review materials should be sent out to the class by the Friday before the presentation. Please select a date for your paper presentation – preference will be given on a first come first served basis.***

Late Work: All work is expected to be completed on time.

Disabilities: Students with disabilities that require accommodation should contact the instructor so that the necessary arrangements can be made.

Course Outline

Date	Topic
Jan 24	Introduction: Course Requirements, Basic Hydrologic Concepts (Ch 1-2) Homework: (Introduction to Hydrodesktop) Water Cycle Movie Dingman Chapter 1-2
Jan 31	Climate, soils and vegetation (Ch 3) 15min Student Presentation: Scott McDermott [article] Homework: (Climate/ENSO Analysis) Dingman Chapter 3
Feb 7	Water in Soils (Ch 6) 15min Student Presentation: Homework: (Radiation/Soil Moisture)
Feb 14	Hydrometeorology 15min Student Presentation: Andrew Badger Homework (None)
Feb 21	Precipitation (Ch 4) 15min Student Presentation: James Rasure Homework: (Precipitation Data Analysis)
Feb 28	Team Project Proposal Presentations
March 6	Snow and Snowmelt (Ch 5) – 15min Student Presentation: Joe Maloney Homework:
March 13	**Spring Break (no class)**
March 20	Evapotranspiration (Ch 7)

15min Student Presentation: Heather Hunter
Homework: (Dingman, Q7-1,7-2,7-3)

March 27 Groundwater (Ch 8)
15min Student Presentation: Lori Mandable
Homework: (TBD)

April 3 Water in Oceans – Guest Lecturer?, Dr. Barry Klinger, AOES
15min Student Presentation: Erik Tucker

April 10 Streamflow (Ch. 9)
15min student Presentation: Eric
Homework: (TBD)

April 17 Water in Ice
15min Student Presentation: Kathleen Roberts

April 24 Water Resource Management (Ch 10)
15min Student Presentation: Allison Richards

May 1 Team Project Presentations & Review for Final
Final Exam Guidance

May 15: 4:30-7:15pm Final Exam

NOTE: This is a course outline and is subject to revision at the discretion of the instructor. You will be informed in class if changes are made.

WEB RESOURCES:

On-Line Precipitation Data:

http://www.eol.ucar.edu/projects/hydrometnet/virginia/
http://www.afws.net/search.htm
http://va.water.usgs.gov/

http://waterdata.usgs.gov/va/nwis/current/?type=precip&group_key=county_cd
http://afws.erh.noaa.gov/afws/county.php?type=precip&state=51
http://www.erh.noaa.gov/marfc/Archive/Precip/
http://www.cocorahs.org/ViewData/
http://climate.geog.udel.edu/~climate/html_pages/download.html
http://www.mlbs.virginia.edu/data.html

Hydrologic tools and data:

http://his.cuahsi.org/

ACADEMIC INTEGRITY: GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

GMU EMAIL ACCOUNTS: Students must activate their GMU email accounts to receive important University information, including messages related to this class.

OFFICE OF DISABILITY SERVICES: If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.gmu.edu

OTHER USEFUL CAMPUS RESOURCES:

WRITING CENTER: A114 Robinson Hall; (703) 993-1200; http://writingcenter.gmu.edu
UNIVERSITY LIBRARIES "Ask a Librarian" http://library.gmu.edu/mudge/IM/IMRef.html
COUNSELING AND PSYCH SERVICES (CAPS): (703) 993-2380; http://caps.gmu.edu

UNIVERSITY POLICIES: The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university affairs.