Hydrologic Science Specialization

Dr. Boving
Geosciences
Earth and Hydrologic Science

• **Focus**: Study of earth sciences at multiple scales.
Study Areas

- **Earth surface processes**
  - Coastal hazards and landscape development during and after deglaciation, incl. climate change

- **Hydrogeology**
  - Groundwater and surface water processes, contaminant transport and cleanup, and modeling;

- **Solid earth materials and processes**
  - Natural hazards and Earth resources

- **Paleo-environments** of dinosaur-bearing rocks.
HOW MUCH DOES IT PAY?
Geoscientists – Employment and mean wage estimates

Except Hydrologists and Geographers

<table>
<thead>
<tr>
<th>Employment (1)</th>
<th>Employment RSE (3)</th>
<th>Mean hourly wage</th>
<th>Mean annual wage (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34,690</td>
<td>3.2 %</td>
<td>$52.12</td>
<td>$108,420</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics  
(Accessed 10-10-2014)
# Geoscience – Industries with the highest levels of employment

<table>
<thead>
<tr>
<th>Industry</th>
<th>Employment (1)</th>
<th>Percent of industry employment</th>
<th>Hourly mean wage</th>
<th>Annual mean wage (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and Gas Extraction</td>
<td>9,020</td>
<td>4.68</td>
<td>$74.15</td>
<td>$154,230</td>
</tr>
<tr>
<td>Architectural, Engineering, and Related Services</td>
<td>7,360</td>
<td>0.55</td>
<td>$42.19</td>
<td>$87,760</td>
</tr>
<tr>
<td>Management, Scientific, and Technical Consulting Services</td>
<td>4,890</td>
<td>0.42</td>
<td>$40.14</td>
<td>$83,490</td>
</tr>
<tr>
<td>State Government (OES Designation)</td>
<td>2,470</td>
<td>0.11</td>
<td>$33.11</td>
<td>$68,870</td>
</tr>
<tr>
<td>Colleges, Universities, and Professional Schools</td>
<td>2,420</td>
<td>0.08</td>
<td>$40.73</td>
<td>$84,720</td>
</tr>
</tbody>
</table>

Hydrology – Industries with the highest levels of employment

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<th>Annual mean wage (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Executive Branch (OES Designation)</td>
<td>1,880</td>
<td>0.09</td>
<td>$40.19</td>
<td>$83,590</td>
</tr>
<tr>
<td>Management, Scientific, and Technical Consulting Services</td>
<td>1,580</td>
<td>0.14</td>
<td>$40.01</td>
<td>$83,220</td>
</tr>
<tr>
<td>State Government (OES Designation)</td>
<td>1,160</td>
<td>0.05</td>
<td>$30.67</td>
<td>$63,790</td>
</tr>
<tr>
<td>Architectural, Engineering, and Related Services</td>
<td>1,070</td>
<td>0.08</td>
<td>$40.80</td>
<td>$84,870</td>
</tr>
<tr>
<td>Local Government (OES Designation)</td>
<td>550</td>
<td>0.01</td>
<td>$33.36</td>
<td>$69,400</td>
</tr>
</tbody>
</table>
Starting Salaries for Graduates that Accepted a Job in the Geosciences

- BA/BS
- MA/MS
- PhD

- Less than 30K
- 30-40K
- 40-50K
- 50-60K
- 60-70K
- 70-80K
- 80-90K
- 90-100K
- 100-110K
- 110-120K
- More than 120K
Example Job Description: Hydrologist

- **Education and Training:** Advanced degree

- **Mean Salary:** $79,260* per year

- **Employment Outlook:** Excellent

Education and Training Requirements

• A bachelor's degree in a field related to hydrology is required.

• A master's degree is strongly preferred.

• Related fields of study include geology, geophysics, civil engineering, soil science, forestry, and agricultural engineering.

• Essential courses include chemistry, physics, calculus, water quality, hydrology, hydraulics, and meteorology.

Employment Outlook

• Employment for hydrologists is expected to grow much faster than the average.

• Hydrology-related projects are affected by government spending limitations. However, hydrologists will be needed to help companies comply with the growing number of environmental laws and regulations.

Advancement Possibilities

• Employees have excellent potential for advancement, especially if they pursue graduate studies.

• May become supervisors, project directors, or agency administrators.

• May obtain research grants, join college or university faculties, or become top-level government or industrial consultants.

Working Conditions

• Requires a substantial amount of site work, particularly for beginners. This type of fieldwork can be uncomfortable, strenuous, and even somewhat risky.

• Expectation is to work in remote areas, walk long distances over rough terrain, carry heavy equipment, and wade in streams and other bodies of water. Moreover, they work outdoors in all types of weather conditions.

• Although hydrologists generally have a regular forty-hour workweek, overtime may be required to meet deadlines. They also may have to travel long distances.

What classes to take?
...a few examples:

- GEO 468 – Groundwater and Low Temperature Geochemistry
- GEO 483 – Hydrogeology
- GEO 482 – Remediation Technologies
- GEO 484 – Environmental Hydrogeology
- GEO 568 – Isotopes in Hydrogeology
- GEO 583 – Ground-Water Modeling
- NRS 361 - Hydrology & Water Management
- NRS 412 - Soil-Water Chemistry
- NRS 409 - Introduction to GIS
- NRS 410 - Fundamentals of GIS
- NRS 424 - Wetlands and Land Use
- NRS 452 - Soil, Water, and Land Use Investigations
- HPR 411 - Developing Solutions for Developing Communities
- CVE 370 - Hydraulic Engineering
- CVE 470 - Water and Wastewater Transport Systems
- CVE 475 - Water in the Environment
- CVE 478 - Hazardous Waste Disposal and Solid Waste Management

- Also: NRS Watershed Hydrology, Ecohydrology, Soil Morphology and mapping, Soil microbiology, Soil and Water Chemistry.
Faculty - Geosciences

Dr. Cardace – Biogeochemistry

Dr. Fastovsky – Paleontology

Dr. Savage – Geophysics

Dr. Boving – Hydrogeology

Dr. Engelhart – Coastal Processes

Dr. Veeger – Hydrogeology

Dr. Pradhanang
Partners
Thanks !
• More Info....
Hydrology

Def.: the study of the movement, distribution, and quality of water throughout the Earth, including the hydrologic cycle and water resources.

The term *hydrology* is from Greek: ὕδωρ, hydōr, "water"; and λόγος, logos, "study".
Hydrology

Hydrology has evolved as a science in response to the need to understand the complex water system of the earth and help solve water problems.
Hydrogeology is an Interdisciplinary Subject!

Hydrogeology deals with the chemical, physical, biological and even legal interactions between soil, water, nature, and society.
Domains of Hydrology

- Surface / Groundwater Hydrology
- Hydrogeology
- Environmental Hydrology
- Hydro-meteorology
- Hydro-chemistry
- Eco-hydrology
Where to Go for More Information

American Institute of Hydrology
300 Village Green Circle, Ste. 201
Smyrna, GA 30080
(770) 384-1634

http://www.aihydrology.org

We use our geological, physics, and mathematics knowledge for:

- Exploration for oil, gas, minerals
- Underground water
- Waste disposal
- Land reclamation
- Solving environmental problems.
A practitioner of hydrology is a Hydrologist, working within the fields of either:

- Earth or Environmental Sciences
- Physical Geography
- Geology
- Civil and Environmental Engineering
Earth and Hydrologic Science

- Provide insight into the structure and processes in earth systems.

- Understanding of earth and hydrologic hazards and the application of earth science to management issues.

- Offer tools for effectively communicating how to live with a dynamic natural environment.
# Geoscientists – Top paying industries

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<tr>
<th>Industry</th>
<th>Employment</th>
<th>Hourly mean wage</th>
<th>Annual mean wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum and Petroleum Products Merchant Wholesalers</td>
<td>80</td>
<td>$67.18</td>
<td>$139,740</td>
</tr>
<tr>
<td>Oil and Gas Extraction</td>
<td>6,500</td>
<td>$65.52</td>
<td>$136,270</td>
</tr>
<tr>
<td>Management of Companies and Enterprises</td>
<td>NA</td>
<td>$62.79</td>
<td>$130,590</td>
</tr>
<tr>
<td>Office Administrative Services</td>
<td>40</td>
<td>$57.77</td>
<td>$120,160</td>
</tr>
<tr>
<td>Petroleum and Coal Products Manufacturing</td>
<td>NA</td>
<td>$57.15</td>
<td>$118,870</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics  
(Accessed 09-21-2010)