

## Senior Level Hydrological Observatory Design Experiences using the Real-Time Hydrologic Network (RTHnet) Experiment

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### ABSTRACT

The *Real-Time Hydrologic Network* (RTHnet) experiment is being organized by a working group of faculty from the programs of Civil Engineering, Forestry, Soil Sciences, Geography, and Meteorology who have been tasked with advancing the training of students in natural system sensors/sensor networks while jointly modernizing the current research infrastructure within the Pennsylvania State University's experimental forest. Research and educational activities since 2004 have focused on designing, deploying, and maintaining a surface-layer micrometeorological network, stream gages, soil moisture profilers, and pressure transducers for monitoring groundwater levels. Real-time, internet accessible data from these sensor arrays will support research efforts investigating interactions between the atmosphere, surface and subsurface terrestrial processes, and the riverine hydrologic system. The purpose of this paper is to motivate and describe a senior level *Field Methods in Watershed Hydrology* course that uses a "research-based learning" framework to advance RTHnet's pedagogical and research goals. The initial course offerings of the *Field Methods in Watershed Hydrology* course have facilitated major student contributions to RTHnet, which include (1) aiding in the deployment and testing of the sensor arrays and (2) path study analyses used to design wireless, real-time data transfer from the field sensor arrays to the internet connected base station located more than a kilometer from the experimental site. Student feedback on the course shows an improved understanding of observation network uncertainties and that the hands-on design experiences helped them formulate a more complex view of watershed hydrology relative to classical lecture-based learning.

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