



## Watershed Science Master Class

*A short course for graduate students and post-doctoral fellows  
Sponsored by CUAHSI and the University of Arizona*

**When?** January 20-24, 2014

**Where?** Biosphere 2 near Tucson, Arizona

**What?** A week-long short course focusing on hydrologic and biogeochemical watershed processes including theory, experimental design, and modeling

### **Instructors**

Jeff McDonnell, University of Saskatchewan

Peter Troch, University of Arizona

Christina Tague, University of California, Santa Barbara

Rick Hooper, CUAHSI

**Tuition:** \$900, including course fees, room (double occupancy) from Sunday until Friday, all meals, and shuttle transportation between Tucson Int'l Airport and Biosphere 2. Single occupancy supplement, \$200. University credit available from University of Arizona at additional cost.

## Course Description

This week-long short course presents a unique opportunity for students and post-docs to explore watershed hydrology and biogeochemistry both conceptually and empirically with hands-on use of the newly commissioned Landscape Evolution Observatory (LEO) facility. Differing perspectives on watershed science theory, experimental design, and modeling will be provided by four leading scientists in the field.

We will start by reviewing how hydrologists have conceptualized runoff generation processes. How have these concepts changed over time and, in particular, how did the inclusion of tracers impact our thinking about streamflow generation? We will then examine catchment processes in more detail and explore the use of energy balance and dimensionless analysis for understanding water fluxes across a range of different environments and scales. We confront these conceptual ideas with measurements at the Landscape Evolution Observatory ([LEO](#)), a unique large-scale experimental facility at [Biosphere 2](#). Students will have the opportunity to run an experiment with LEO and to analyze data from this facility. The next topic is the use of multiple tracers in design of watershed studies and for developing a more comprehensive understanding of multiple and interacting watershed processes. Finally, integrated catchment modeling will be presented as a means to synthesize data and to test quantitative hypotheses of catchment processes.

Course learning objectives include

- Rainfall-runoff processes
- Hydrochemical and isotopic measurements and analyses
- Combined use of hydrometric and tracer approaches
- Use of simulation models for field design and hypothesis testing

## Course Setting

This course will be held at the Biosphere 2 Conference Center, a self-contained campus with housing in Santa-Fe style *casitas* with living rooms and kitchens in the foothills of the Catalina Mountains. The course will be informal with extensive time allowed for discussions and interactions among students and instructors. All meals will be catered on site and instructors will reside on campus to maximize opportunities for interactions.

## Course Schedule

Sunday, January 19. Arrival at Tucson Int'l Airport and transfer to B2 Conference Center. Informal dinner at 6 pm. *Students present posters of their research.* Meet and greet the instructors.

Monday, January 20.

Morning: Jeff McDonnell: Concepts in streamflow generation and the impact of tracers; use of hydrometric and tracer approaches in experimental design

Afternoon: Introduction and tour of LEO facility; classroom exercises on streamflow generation

Evening: Discussion groups around benchmark papers in watershed science

Tuesday, January 21

Morning: Peter Troch: Conceptual approaches to catchment structure and function: energy balance, transit time distribution, and dimensionless analysis

Afternoon: Experiment using LEO Facility

Evening: Discussion groups around benchmark papers

Wednesday, January 22

Morning: Data reduction and analysis of results from LEO experiment

Afternoon: Rick Hooper: Use of multiple tracers and experimental design in catchments

Evening: Discussion groups on experimental results

Thursday, January 23

Morning: Christina Tague: Integrated modeling of water, biogeochemistry, and vegetation in watersheds; use of complex simulation models in experimental design

Afternoon: Problems sets on integrated watershed modeling

Evening: Discussion groups on modeling and experimental design

Friday, January 24

Morning: Course wrap-up and student discussion

Afternoon: Transfer to airport