

Ferdi Hellweger – Teaching Plan

Models in Environmental Engineering Education

I enjoy teaching and look forward to contributing to the undergraduate and graduate curricula. I have taught a number of pre-conference and continuing education courses (see resume) and the feedback I received was always very positive. Based on that experience, and a fundamental desire to teach, I believe that I have the potential to become an excellent teacher. I am interested in new teaching concepts and technologies and I would welcome the opportunity to explore them (see UTFLOW Applet below). I plan to apply for a grant through the NSF Early Career Development Program to help jumpstart my teaching program.

How does my modeling connect to the classroom?

I believe that modeling skills are useful and necessary for both researchers and practicing engineers, and are therefore an important part of an engineering education. (1) *Researchers*. Models are essential for integrating physical, chemical, and biological processes from laboratory research with field observations. (2) *Practicing engineers*. The profession is becoming increasingly systems based, where individual components (e.g. treatment plants) are analyzed as part of the whole system (e.g. watershed). This systems based approach utilizes models as analysis tools. I consider my practical consulting experience as invaluable in teaching in this area. In fact, the reason I went into practice between my MS and PhD was to gain experience that I could use as a faculty member in education.

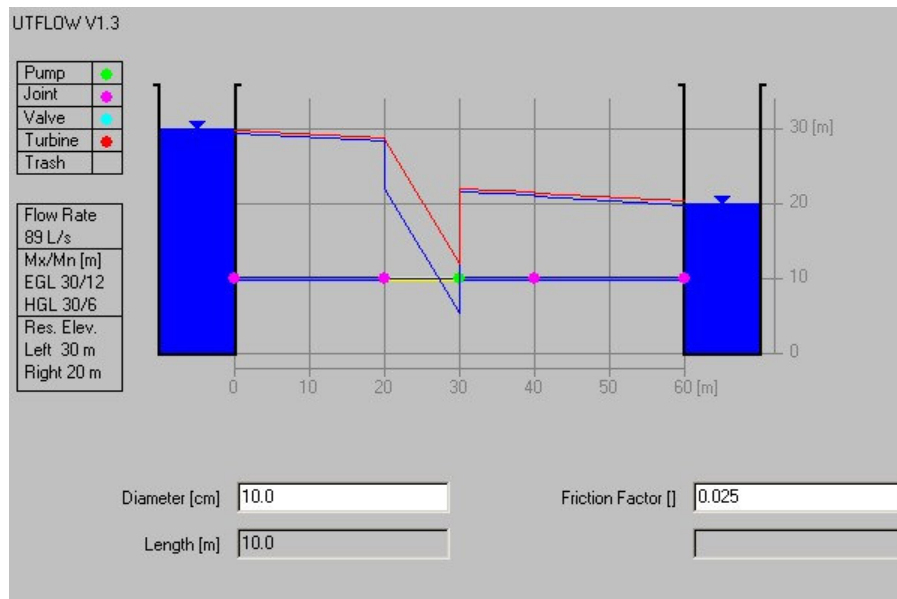
Connecting observation and modeling: Charles River course couple

I envision two graduate level courses that integrate field and laboratory observations with modeling. The two courses would cover the basics of water quality observing and modeling, respectively. However, the courses would be thematically connected through a problem (e.g. pathogens) and a water body (e.g. Charles River). In the first course, students would use traditional and novel observing technologies to characterize the water body. This would involve field measurements of fecal coliform bacteria, temperature, solar irradiation and salinity. The second course would focus on using modeling to understand the field data. This would involve simulating fecal coliform concentration in the water body.

In addition to the value of each individual course, this course couple would teach students how observational and modeling techniques can be used together in the analysis of complex systems. The course couple would be useful for undergraduate and masters students, because water quality modeling is often used in practice. For PhD students it could provide the basis for future research. This could include extending the work from the course to other water quality problems (e.g. eutrophication) or applying the model to another water body (e.g. Boston Harbor, Massachusetts Bay). If there is enough interest from the faculty I will make this the topic of my NSF Early Career Development Program grant proposal.

What courses am I qualified to teach?
(from NU catalogue)

- *CIVU331 Fluid Mechanics.* I served as TA for this course for two years while I was an undergraduate student at NU. See also UTFLOW Java Applet I developed below.
- *CIVG260 Hydrology.* I can teach this course right now. My graduate advisors at UT Austin (David Maidment) and Columbia U (Upmanu Lall) are both hydrologists, so my education has always had a strong focus on hydrology.
- *CIVG261 Surface Water Hydraulics and Quality Modeling.* I can teach this course right now. This is my main area of specialty.
- *CIVG262 Watershed Management.* I can teach this course right now. This has been my area of focus at HydroQual. Presently I am the project manager for a TMDL (Total Maximum Daily Load) project for polychlorinated biphenyls (PCBs) in the Delaware Estuary. This work is sponsored by a coalition of point source dischargers.
- *CIVG263 Groundwater Hydraulics and Quality Modeling.* I can teach this course, but would need some time to prepare. It is not my main area of specialty. I am familiar with the concepts and have taken several graduate courses in this topic. However, I would have to do some research on what text is best, etc.
- *CIVG270 Environmental Protection and Management.* I can teach this course, but would need some time to prepare. I can build on my consulting background in this course. Would have to do some research on course material.



UTFLOW: Fluid Mechanics Internet Educational Tool Developed by Ferdi Hellweger. To try it live go to: <http://www.ce.utexas.edu/prof/maidment/gishydro/ferdi/webedu/utfLOW/utfLOW.html>