**CIE 701: Engineering for Ecosystem Restoration**

Dates: June 7 to 25, 2010 (summer session)
Days: Monday to Friday
Time: 8:00 AM to 5:00 PM
Location: 223 Jarvis
Instructors Joe Atkinson, Professor (atkinson@buffalo.edu)
David Blersch, Research Scientist (dblersch@buffalo.edu)
Dept. of Civil, Structural and Environmental Engineering
202 Jarvis Hall, (716) 645-4001

**Course Description**

A series of three field-intensive workshop courses focusing on engineering and ecological aspects of stream and lake restoration and their surrounding watersheds. The course is split into three three-day component workshops on stream restoration, plus three training modules on tools and techniques related to stream and ecosystem restoration. Each workshop and module has a different topical approach and is team-taught by guest lecturers who are experts in their fields. These workshops and their anticipated schedule are as follows:

**Week 1, June 7 – 11, 2010**

**Training Module 1: Distributed Temperature Sensing for Stream Hyporheic Exchange**

**Dates:** June 7 and 8, 2010

**Instructor:** Dr. Chris Lowry (Department of Geology, University at Buffalo)

**Topics:**
- Introduction to theory and operation of DTS systems;
- Overview of instrument and fiber selection and maintenance;
- Field deployment and data acquisition to identify and quantify locations of hyporheic exchange using the DTS;
- Manipulation and analysis of high temporal and spatial resolution temperature data.

**Workshop 1: River Processes, Fluvial Geomorphology and Channel Processes**

**Dates:** June 9-11, 2010

**Instructors:**
- Dr. Sean Bennett (Department of Geography, University at Buffalo)
- Dr. Kelly Frothingham (Department of Geography and Planning, Buffalo State College)
- Dr. Andrew Simon (USDA Agricultural Research Station, National Sedimentation Lab)

**Topics:**
- Overview of physical parameters of riverine ecosystems; fluvial geomorphology, hydraulics, sediment transport and vegetation;
- Application of fluvial geomorphic methods to natural restoration design;
- Field and analytical techniques for streambank stability and erosion;
- Rapid assessment of stream function and state;
- Watershed management;
- Field measurements – at least one field day in a local stream to demonstrate data collection (channel and bank characterization, stream flow, bank stability, etc.).
Week 2, June 14 – June 18, 2010

Workshop 2: Stream Restoration, Hydraulic Structure, Biological Assessment and Bioengineering Design

Dates: June 14-16, 2010

Instructors: David Derrick (Restoration Specialist & Vice President, River Research and Design, Inc.)
Paul Fuhrmann (Ecology and Environment, Inc.)

Topics:
• Overview of biological parameters of riverine ecosystems;
• Field biological assessments, characterizations and statistical analysis;
• Philosophy of restoration, function-based design, project planning, monitoring;
• How streams dissipate energy, channel evolution model;
• General stream evaluation, introduction and overview of methods;
• Stream restoration design based on form and function of stream ecosystems;
• Bioengineering techniques and riparian management;
• Field trips for case studies of western NY stream and riparian restoration projects.

Training Module 2: Water Quality and Stream Flow Sensing

Dates: June 17 and 18, 2010

Instructors: Personnel from YSI Inc. and Sontek Inc.

Topics:
• Water quality parameters (DO, nutrient, pH)
• Water flow characterization using Sontek acoustic Doppler
• Field deployment and data collection
• Data manipulation and analysis

Week 3, June 21 – June 25, 2010

Workshop 3: Ecology and Hydrology for the Lower Great Lakes

Dates: June 21-23, 2010

Instructors: Helen Domske (New York Sea Grant, University at Buffalo)
Dr. Randal Snyder (Biology Department, Buffalo State College)
Dr. William Edwards (Biology Department, Niagara University)

Topics:
• Hydrological overview for Great Lakes region
• Great Lakes ecological networks
• Ecosystem stressors and management issues
• Fisheries science and management (field sampling practicum)
• Stream benthic macroinvertebrate identification practicum

Training Module 3: Modeling for Environmental and Ecological Problem-Solving

Dates: June 24 and 25, 2010

Instructors: Joe Atkinson (Environmental Engineering Dept., University at Buffalo)
David Blersch (Environmental Engineering Dept., University at Buffalo)

Topics:
• Systems modeling with STELLA
• Water quality and mass balance modeling
- Modeling of ecological and general systems

**Proposed Calendar**

**June 2010**

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