

ENVE 865-001: Watershed Analysis – Fall 2012

Wednesdays 3:00 – 5:50pm. AEL 275

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Course Description:

This course focuses on land use change (LUC) and the hydrologic cycle in agricultural and forest (non-urban) watersheds. Using climate, hydrology, and agricultural models, students will investigate how changes in hydroclimatology and landscape-scale land cover affect surface water flow, runoff, and water quality in selected watersheds. The course will explore emerging topics pertaining to water and energy that course through rural watersheds, with the goal of interpreting data output from models into an environmental life cycle assessment (LCA) framework. LCA is a systems analysis framework that feeds information on life cycle environmental damages/consequences back into design and decision making. In this way, this course focuses specifically on watershed analysis models and how their output feed into designing metrics that describe environmental damages, which in turn aid in the evaluation of alternative design strategies.

A systems evaluation framework will be presented throughout the course and quantification will be emphasized. The complexity of environmental issues related to land use change and the hydrologic cycle will become apparent as the semester progresses. The course will introduce systems and policy analyses methods (e.g., life cycle assessment, material flow analysis, sustainability metrics, and potentially economic valuation). The course will incorporate instructor and student-led presentations and discussions. This course assumes students have a background in science or engineering and have taken a course in engineering economics or other economics. Students with other backgrounds must consult the instructor.

Course Objectives:

By the end of the course, students will have an understanding of the complexity of LUC and the hydrologic cycle. Additionally, they will have an awareness of the analytical tools and resources for evaluating the implications for the environment using a systems perspective. Students will be able to critically evaluate existing and new tools. They will have applied these methods and tools to research questions.

Pre-requisites:

Engineering economic analysis; hydrology, fluid mechanics or transport phenomena

Course Readings:

Course readings will consist of a set of research papers from journals, and in some cases book sections.

Course Website:

Lecture notes and other handouts will be posted on the Blackboard Learn website. Check the site regularly, however, generally an email will be sent to you when notes are posted.

Course Requirements and Grading: 100% total (subject to change)

Modeling exercises (assignments)	30%
Article review and Presentation	10%
Participation	5%
Written Project Proposal	5%
Written Final Project Report (40%) and Oral Presentation (10%)	50%

All written assignments will be graded taking into account both technical content and the quality of the written report (e.g., communication of the material to the reader). Ensure all of the report sections indicated in the relevant handouts are included in your written submissions. Oral presentations will be graded based on structure of the presentation, powerpoint slides, and communication with the audience.

Modeling Assignments

Assignments that use the online tools, SWAT, CropWAT, AQUACrop, and IFSM tools will be assigned, and due at the beginning of the following session.

Article Review and Presentation:

Each student is required to critically review an article from a selected set of journals assigned in the reading list covering climate, watershed modeling, land use change and the hydrologic cycle, or water analysis and LCA. A 15-minute presentation will be part of this component. Submission of a review (up to 3 pages, double-spaced) and the powerpoint will be required. Further details will be given in class.

Major Research Project:

Students will complete a major research project, individually or with a partner. The project will encompass a one-page written proposal, a written final report and final oral presentation. Further details will be given in class.

Course Policies:

This course will involve in-class discussion and debate, both important learning components of the course. Students should attend and participate in all classroom sessions, except for those occasions warranting an excused absence under University Policy, and arrive on time and prepared for class.

Course Topics*

<i>Session</i>	<i>Topic</i>	<i>Assignment</i>	<i>Lead</i>
1: Sep 26	Framing lecture		Spatari
2: Oct 3	Climate	1	Block
3: Oct 10	Watershed Tools Arc Hydro Tools, NWIS Tool		Block
4: Oct 17	Time-series sampling in Hydrology	2	Block
5: Oct 24	Introduction to LCA & SimaPro	3	Spatari
6: Oct 31	Farm-scale economic/envIRON. tools IFSM demonstration	4	Spatari/Guest
7: Nov 7	True value of LUC: global agricultural impacts Integration of environmental and economic metrics		Spatari
8: Nov 14	Land use / Agriculture CropWat, AquaCrop	5	Block
9: Nov 28	Introduction to SWAT		Spatari/Guest
10: Dec 5	Project Work		
11: Dec 12	Project presentations		Students

Academic Policies:

Academic Integrity:

Drexel University is committed to a learning environment of academic honesty. To protect members of our community, there will be no tolerance for plagiarism in any form. For assignments, the submitted work must represent your efforts, and yours alone, unless otherwise specified by the instructors. Violations of this policy will result in a grade of zero for the assignment. Drexel's academic honesty policy:
<http://www.drexel.edu/judicial/honesty.html>

Americans with Disability Act:

Students with documented disabilities who require course accommodations, have emergency medical information, or other, should contact the instructor within the first two weeks of the course. Verification of arrangements must be made through the Office of Disability Services, Room 215 Creese Student Center, 215.895.2506. Further information may be found at: <http://www.drexel.edu/oed/disabilityResources/>

*The instructors reserve the right to modify this syllabus as circumstances warrant.