Saint Mary's University of Minnesota

B100 Introduction to Watershed Management
3 credits

Name and title of faculty
Email address
Office location
Office telephone
Office hours

Required learning materials:
Text: Carlsen, W., Trautmann, N., Cunningham, C., Krasny, M., & Welman, A. (2004). *Watershed dynamics: Cornell scientific inquiry series*. Arlington, Va: NSTA Press.

Course description: This course is an investigation of urban and rural watershed ecology issues through a problem-based experience using STEM tools. The focus is on what minority urban students need to excel in science using spatial technology to provide the landscape context for urban vs. rural differences in watershed ecology. Collaboration between university professors of science and education, urban high school teachers, and undergraduate science and education majors is an integral part of this course, which features extensive field explorations, data collection, and analysis and synthesis. It culminates in a poster presentation of an individually-designed water ecology research project.

This will be offered as a science elective.

Prerequisites: Successful completion of Countdown to College, year 1 and 2

Course goals - This course is designed to assist students to:

- develop scientific habits of mind
- use geospatial tools to learn sampling techniques and collect data.
- integrate rural and urban watershed ecology issues

Learner outcomes Upon successful completion of this course, students will:

Year 3

Know:

- That connections exist in watersheds between and among land, air, water, and humans
- What types of pollution impact watersheds
- What the Scientific Method is and how it works
- How to judge scope and scale–aquarium vs. lake–and how solutions to problems will vary depending on scope and scale
- How to make descriptive and qualitative observations
- How to make explanatory and quantitative observations
- How to explain causes and predict consequences
- How to transfer practices and skills (observation, collection, analysis, etc.) learned and applied in rural watersheds to urban contexts and to urban problems

Be able to:

- Propose and develop hypotheses
- Carry out basic investigations into watershed issues
- Identify credible vs. unreliable sources
- Complete an exercise in inquiry, with guidance
- Create an organized and concept-rich lab report (state research question and hypothesis in a well-written introduction, state the method and describe the proposed experiment, integrate experiment results, and discuss)
- Use technology tools to collect, graph, and analyze data (GeoObserver, Vermier multimeters, Excel graphing

Academic Year between C2C-3 and C2C-4

- Contact a water treatment plant in your area, visit if possible, but research their web page as a starting point for sure. Ask and answer the following questions:
    - Where does water come from before the treatment plant?
    - What happens at the treatment plant? (Summary of treatment process e.g., volume treated, number of people served, etc.)
    - Where does water go after the treatment plant?
    - Where does water go after the tub or the toilet drains?

Year 4

Know:

- Basic solutions to environmental problems–urban and rural
- Fundamental issues relating to invasive species–urban and rural

Do:

- Identify and use credible sources to carry out research
- Plan and conduct an independent inquiry experiment
    - observation, question, hypothesis, data collection, analysis, and interpretation
- Plan an Environmental Improvement Project (EIP)
    - observation, question, hypothesis, data collection, analysis, and interpretation
- Prepare a poster on EIP
- Defend a research proposal

Assessment Opportunities: -

Year 3

1. Daily Viewing Guide for flipped classroom lectures (Tegrity) (30 points)
2. Lab sheets: Summary paragraph (30 points)
3. Culminating Assignment: Full lab report (40 points)

Year 4

1. Formative lab report: Sewage treatment in home city (15 pts.)
2. Daily Assignments (15 points)
3. Summative lab report: Toxicology (30 points)
4. Culminating Assignment: Poster--Personal research proposal (40 points)

Evaluation procedure/methods/criteria:

1. Formative lab report, daily assignments, and viewing guides will be graded:
    a. 3 = outstanding
    b. 2 = meets expectations
    c. 1 = below expectations

2. Culminating assignments will be judged by rubrics. These rubrics will be discussed with students at the beginning of the course. The final Poster presentation will be judged by self, peers, instructors, and external judges.

Policy on attendance and tardiness

Information about how students will learn if you must cancel class

Policy and penalty for missed/late exams, assignments, etc.

This syllabus is subject to change in order to respond to student learning needs.

Course calendar

Location	SMU	SMU	CM	SMU	SMU/WSU	SMU	WW	SMU	SMU	SMU	SMU	SMU	SMU
Date													
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Day	0	1	2	3	4	5	6	Break	7	8	9	10	11
Tegrity Lecture Night			Key Notions about Water itself	Introduction to Pollution: Types, Point and Non-point	Flume Table Intro	Key Physical Characteristics of Streams; pH, Conductivity and Turbidity			Intro to Invertebrates	Urban Pollution	Intro to Water Chemistry: Ions, Dissolved Oxygen		
8:30 9:30	Breakfast	Introductory Notions about Watershed Ecology (Rural and/or Urban)	Outdoor Scavenger Hunt:		Alternating Groups: One at Flume Table Intro and Flume Tables @ WSU; other at Math and	Mapping rate and flow	Mapping rate and flow? Erosion exhibit? Town of Beaver?	At Mall of America or Similar	Collect and Organize Invertebrates with Water Sampling	Sample and Collect Drainage #3	Water Chemistry	Review of Stream Chemistry: polluted rivers and pristine rivers	Both Groups - Poster Presentations of Y4
9:30 - 10: 30	Mass	Map Walkabout	Indoor Scavenger Hunt	Groundwater and Ground Filtration Lab		Salt Bombs					Analysis of Sampling	Comparison Activity	
10:30 - 11:30	Testing and Charades	Gilmore Creek Delineation	GeoObserver Walkthrough			Plotting Data and Review					Plotting Data and Review	Project Brainstorming	
6:00 - 7: 30 Study Hall	Garvin Heights Observation (6 PM) Intro to	Watch Lecture Read Ch. 1	Watch Lecture Read Ch. 2	Watch Lecture Supplemental Reading	Watch Lecture Write Flume Table Summary Using Ch 1 and 2	Watch Lecture Read Ch. 4	NO STUDY HALL	Watch Lecture	Watch Lecture Read Ch. 3	Watch Lecture Supplemental Reading	Watch Lecture Read Ch. 5	Internet Searching for Projects	

Location	SMU	SMU	SMU	SMU	SMU	SMU	SMU	SMU	SMU	SMU	SMU	SMU
Date												
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Day	1	2	3	4	5	6	Break	7	8	9	10	11
Tegrity Lecture Night		Intro to Sewage Treatment	Introduction to toxicity									
8:30 - 9:30	Review of Y3 Concepts	Field Trip to Shive Creek	Begin Toxicology Experiment with Nutrients	Alum (Flocculent) Experiment	Experiments and Predictions of Garvin Brook	Complete Toxicology Experiment with Nutrients	At Mall of America or Similar	Clarify Project Problem	Question and Hypothesis	Project Design	Final Poster Work	Y4 Presentations
9:30 - 10:30	Review of Summer Homework	Sewage Treatment Tour										
10:30 - 11:30	Discussion about Homework				Plot, Reflect, and Predict	Plot Data and Reflect					Posters Due - No Exceptions	Graduation
1:00 - 2:25						Field trip to Perrot						
6:00 - 7:30 Study Hall		Compare and contrast home community treatment with Winona treatment			Visit Garvin Brook Project Website (TU) - Compare and Contrast your observations with theirs	NO STUDY HALL	Identify Project Problem			Poster Work		