SYLLABUS

1. Number and Name: 11:127:494 – LAND & WATER RESOURCE ENGINEERING

2. Credits and contact hours: 3 credits, 2-80 minute lecture periods per week

3. Instructor: Christopher G. Uchrin

4. Required Text: C.W. Fetter, *Contaminant Hydrogeology,* Prentice Hall, 2008.
Reference Text: Freeze & Cherry, *Groundwater,* Prentice Hall, 1979

5. Specific Course Information:

a. Catalog Description: *Principles of groundwater hydrology and pollution. Development of mathematical formulations for describing pollutant movement in groundwater systems. Examination of control measures. Discussion of case studies.*

b. Prerequisites: Permission of instructor

c. Course Type: Technical elective

6. Course Goals:

a. Specific Instructional Outcomes: Students will be versed in the principles of ground water hydrology and pollution. Student problem solving skills will be enhanced through the use of homework projects and an engineering project involving considerable analytical and numerical skills.

b. Specific Student Outcomes addressed by the course include:

e. Ability to identify, formulate and solve engineering problems
Instructional Activity: Successful completion of design project focused on surface a water pollution application
Assessment Activity: Individual grading of student projects focused on:
1. Theoretical development and application
2. Technical accuracy
3. Conclusions
4. Presentation

g. Ability to communicate effectively
Instructional Activity: Successful completion of design project focused on surface a water pollution application
Assessment Activity: Individual grading of student projects

k. Ability to use techniques, skills and modern engineering tools necessary for engineering practice
Instructional Activity: Successful completion of design project and homework assignments incorporating advanced mathematical (computer) modeling techniques focused on surface water quality
Assessment Activity: Individual grading of student projects and homework assignments focused on using advanced engineering tools specifically for technical accuracy and visuals

7. Topics

Lecture	Topic
1-3	Introduction; Hydrologic cycle; Global water budget – Simple systems modeling; Composite hydrologic systems; Conceptual hydrogeologic
1-4	models; Evaporation, transpiration, and runoff
4	Fundamentals of groundwater pollution
5-8	Groundwater hydraulics; Fluid statics; Piezometers; Principles of mass and energy conservation; Continuity equation; Bernoulli's equation
9-10	Fundamentals of groundwater hydrology; Classification of subsurface waters, aquifers Aquifer parameters; Groundwater movement
11-12	Fundamentals of mathematical models; Types of models; Batch systems; Flow systems; Dispersion; Multi-dimensional systems; Finite difference solution techniques
	Exam 1
13	Groundwater chemistry
14-17	Mathematics of groundwater hydrology; Pore velocity; Darcy's Law; Groundwater diffusion equation; 2-dimensional movement; Wells; Dupuit's assumptions; Applications
18-23	Pollutant transport through porous media; Adsorption/desorption; Isotherms and equilibrium conditions; Hysteresis; Microbial transformations; Multi-dimensional systems
	Exam 2
24-26	Unsaturated systems

Grading:	Homework	25%
	Exam 1	20%
	Exam 2	20%
	Project	35%

Prepared by: Christopher Uchrin 05/25/17