

**ENVIRON. ENG. DESIGN
CE 447 (CRN: 16403)**

**DR. CHENJIE WU
SPRING 2015**

LECTURE DAY/TIME/ROOM	TR/11:00 – 12:15/G84 ESB
OFFICE	MRB 268
PHONE	304-293-3046
EMAIL	cwu4@mix.wvu.edu
OFFICE HOURS	Thurs. 2PM-4PM or by appointment

COURSE DESCRIPTION

Students in the class will be introduced to basic scientific theories and engineering principles for design of systems to solve water/energy problems. Real world projects will be discussed in the class and students will be divided into groups to take on those projects. In addition to attending regular lectures, student groups will meet regularly to work as a team and finish their design project. Design projects to be implemented include saline water collection and purification system, brine waste disposal plan, cooling water operation and life cycle analysis.

EXPECTED LEARNING OUTCOMES

Course Outcome	Targeted ABET Program Outcomes
Be familiar with basic engineering design principles	a
Be exposed to existing technologies for water/wastewater treatment	a, e, k
Be familiar with basic principles of sustainable development and project cost estimation	a, e, k
Gain design experience for real world environmental projects	a, c, e, g, k

a = Apply knowledge of math, science, and engineering

c = Design civil engineering projects and components of projects

e = Identify, formulate, and solve Civil Engineering problems

g = Communicate effectively in oral, written, and electronic formats

k = Use techniques, skills, and modern engineering tools

REQUIRED TEXT

No required text.

REFERENCE TEXTS

1. Hammer and Hammer Jr. (2008). Water and Wastewater Technology, 6th^{ed}. Pearson Prentice Hall.
2. Nikolay Voutchkov (2013). Desalination Engineering. McGraw Hill.

CLASS POLICIES***Academic Honesty***

Any student who misrepresents the work of others as his or her own will receive an “F” for the semester and will be referred to the appropriate Chairperson and/or the Dean for disciplinary action.

Lecture

Students are expected to have basic knowledge of mathematics, sciences, and engineering. Attendance will be formally monitored during lecture periods. Attendance and class participation will be considered in the evaluation of a student’s desire to learn.

Homework assignments

Homework assignments will be given during the semester. Homework will be collected in regular class on the due days. Homework grade will be reduced by 10% for each day past the due day. In case of emergency, students are required to provide a proof of the emergent event to get an extension of the deadline.

Projects

The students will be divided into seven groups with each group taking on a design project. The final project report is due 4/30. Your project design will be evaluated based on your proper use of the design principles, calculations, taking the project site into consideration for your design, clear description of your design criteria, and details of your design. More guidelines for project management (e.g., project leader, individual assignments) and details of evaluation of individual contribution to your design project will be given.

PROJECT DESCRIPTIONS

PROJECT	BRIEF DESCRIPTION
Design of Saline water Collection and Treatment System	Design and develop a saline water harvesting system with a diversified water reuse portfolio and/or powered by alternative energy sources
Brine waste disposal or reuse/ Treated water reuse	Estimate and design a manage plan for proper handling of Braine waste; Design an innovative application for the use of treated saline water
Cost estimation and Life cycle analysis	Estimate the cost and sustainability of the designed saline water collection and treatment system

GRADE

Grades will be calculated according to the weighting factors listed in the following table.

Lecture attendance	5%
Homework/Class participation	25%
1 st progress report	20%
2 nd progress report	20%
Final Project Report and Presentation	30%

Just like all working environment, it is reasonable to expect problems as you work with others on your team. It can be a positive learning experience if you face them with a right attitude. It can also be a lot of fun if you work together in a team spirit. It is my hope that you all encourage and help other members on your team and make the best of this exercise.

1. Project leader is responsible for working with his/her team members to come to an agreement of task assignment to each member. You should do your best to divide the work equally. The project leader must clearly document individual responsibility. All team members have to agree with the individual assignments and sign the document.
2. The project design will be graded as a team and individually. Specifically, the score for the overall project design will constitute 50% and the score for individual assignment constitutes another 50%. This grading policy applies for both your progress reports and final product.
3. For progress reports and final project design, each team member will need to submit his/her report to the project leader. The report should document individual work and contribution to the overall project progress or final product. The project leader will need to compile the individual reports and attach them to the team report for submission.

TENTATIVE LECTURE & LABORATORY SCHEDULE SPING 2015 (SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR)

Date	Lecture
1/13/2015	Introduction
1/15/2015	Six-step method
1/20/2015	Project introduction
1/22/2015	Water/Wastewater Characteristics
1/27/2015	Reactor design
1/29/2015	Industrial water/wastewater treatment
2/3/2015	Industrial water/wastewater treatment
2/5/2015	Industrial water/wastewater treatment
2/10/2015	Industrial water/wastewater treatment
2/12/2015	Desalination overview
2/17/2015	Reverse Osmosis
2/19/2015	Reverse Osmosis
2/24/2015	Project work session
2/26/2015	First project progress report
3/3/2015	Sustainable Water Management and Energy conservation
3/5/2015	Sustainable Water Management and Energy conservation
3/10/2015	Boiler Water Systems /Cooling Water Systems
3/12/2015	Waste deposal
3/17/2015	Waste deposal
3/19/2015	Project work session
3/24/2015	Recess
3/26/2015	Recess
3/31/2015	Second project progress report
4/2/2015	Desalination cost estimate
4/7/2015	Life cycle assessment
4/9/2015	Life cycle assessment
4/14/2015	Life cycle assessment
4/16/2015	Project work session
4/21/2015	Project work session
4/23/2015	Project presentation
4/27/2015	Project presentation
4/30/2015	Project presentation