

**PHYSICOCHEMICAL TREATMENT
CIVIL ENGINEERING 542 (CRN: 87677)**

**DR. LANCE LIN
FALL 2018**

LECTURE DAY/TIME/ROOM	TR/2:00 – 3:15/ESB 501
OFFICE	ESB 641A
PHONE	304-293-9935
EMAIL	lianshin.lin@mail.wvu.edu
OFFICE HOURS	Wed. 9AM-12PM or By appointment

COURSE DESCRIPTION:

We will study engineering topics on water and wastewater treatment based on pollutant's physical and chemical characteristics. Topics to be covered in this class include human health concerns related to water, regulations, reactor theory, transport phenomena, and various operation units for water and wastewater treatment. Three real-world projects will be assigned for the students to apply the learned principles in developing a solution to the issues.

COURSE GOALS:

The goals of the course are for students to

1. Be familiar with conventional and emerging issues related to drinking and wastewater
2. Learn basic engineering principles for designing water and wastewater treatment systems
3. Learn the physical and chemical properties of targeted pollutants and reaction kinetics
4. Be able to design treatment processes accordingly to meet relevant water quality standards
5. Apply sustainability concepts in engineering design

REQUIRED TEXT:

- MWH (2012). Water Treatment: Principles and Design 3rd ed., John Wiley & Sons, Inc. ISBN – 9780470405390.

REFERENCE TEXTS:

- G. Tchobanoglous, F. L. Burton, and H. D. Stensel, Wastewater Engineering: Treatment and Reuse 4th Edition, Metcalf and Eddy, McGraw-Hill.

CLASS POLICIES:

Statement on Academic Honesty

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonest and possible ensuing sanctions, please see the policies at <https://provost.wvu.edu/governance/academic-standards-resources> .

Lectures

Students are expected to have basic knowledge of engineering principles. Attendance will not be formally monitored during lecture periods. However, attendance and class participation will be considered in the evaluation of a student's desire to learn.

Homework/Quizzes

Quizzes may be given at the beginning of class on selected topics. Homework will be assigned 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.

Exams and Projects

Learning will also be assessed through exams and/or projects. The students will be work in a team for each project. Team work is essential for completing the project assignments. All are expected to contribute to finishing the project in a professional and timely fashion.

Grading

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

Homework/quizzes	30%
Exam/Project 1	23%
Exam/Project 2	23%
Exam/Project 3	24%

TENTATIVE COURSE TOPICS

(SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR):

- A. Drinking Water Standards
- B. Physical/Chemical/Biological Characteristics of Water and Wastewaters
- C. Material Balance
- D. Transport Phenomena
- E. Reactor Kinetics
- F. Reactor Theory
- G. Water Softening
- H. Coagulation/Flocculation
- I. Geochemistry equilibrium modeling
- J. Filtration Theory
- K. Disinfection
- L. Sorption Processes/Ion Exchange
- M. Advanced Oxidation Processes
- N. Air Stripping
- O. Membrane Separation
- P. Reverse Osmosis
- Q. Treatment Strategies for Emerging Contaminants
- R. Desalination
- S. (Bio)electrochemical Treatment