ENE 262 – INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Department of Civil & Environmental Engineering
New Jersey Institute of Technology
Summer 2017 (May 22 – Jul 12, 2017)

Instructor: Dr. Vatsal Shah, PE
Office Hours: By appointment, 30 minutes before and after class (5:15pm – 5:30pm) and (9:35 – 10:05pm)
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Lab TA: Ahmed Abdella
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Week	**Topic**	**Reading Assignments (in addition to handouts & lecture materials)**
1	-Introduction; Definitions, Regulations/Standards, Environmental Ethics -Mass Balance and Natural Environmental Systems	Ch. 1 Ch. 2
1	-Hydrologic Cycle (*Guest speaker: Kate Greising, PE - Green Infrastructure)* -Physical, Chemical & Biological Parameter	Ch.4 Ch.5
2 & 3	-Water Treatment -Researching Published References & Writing Review Papers *2/7 Lab on Alkalinity meets in Colton 414* *2/21 Lab on Hardness meets in Colton 414*	Ch.6
4	***Midterm (June 12, 2017)***	
4 & 5	-Water Quality Management	Ch.7
5	-Wastewater Treatment *3/21 Lab on Jar Testing*	Ch.8
6	-Air Pollution & Control	Ch.9
6	-Noise Pollution & Control	Ch.10
7	-Solid and Hazardous Waste Management *July 5, 2017 – Papers due*	Ch.11-12
7	Paper Presentations	
8	***Final Exam (July 12, 2017)***	

General Notes: A field trip to an environmental facility will be attempted during the semester.
Lecture topics may change based on availability of guest speakers
Lecture slides will be placed on Moodle.
No late assignments accepted.

Texts: 1) Davis, M.L. and Cornwell, D.A., Introduction to Environmental Engineering, 5th Edition, McGraw Hill Companies, New York, NY, 2013, ISBN 978-0-07-340114-0
2) Handouts and class presentations

Grading:

Midterm	25%
Final Exam	25%
Laboratories	15%
Paper	15%
Presentation	5%
Assignments	15%

Department of Civil and Environmental Engineering
ENE 262 – Introduction to Environmental Engineering

Description:

To introduce students to the integrated science, engineering, design and management concepts of engineered environmental systems. The course will cover environmental regulations and standards, environmental parameters, mass balance and natural systems, water quality management, water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management. Background material and laboratories in the environmental sciences and management areas will be covered. Group term papers and presentations will be required.

Prerequisites: Chem 125, Math 112, and Phys. 121

Textbook(s)/Materials Required:

1) Davis, M.L. and Cornwell, D.A., Introduction to Environmental Engineering,5th Edition, McGraw Hill Companies, New York, NY, 2013, ISBN 978-0-07-340114-0
2) Handouts and class presentations

Course Objectives:

1. Provide students with the most relevant environmental regulations and standards; the driving forces behind environmental science and engineering projects.
2. Provide students with the scientific background needed to assess environmental quality in terms, of the physical, chemical and biological aspects.
3. Provide students with the tools necessary to understand mass balance in environmental systems.
4. Provide students with the basic scientific and engineering principles of water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.
5. Introduce students to environmental report writing.

Topics:

Definition of Environmental Engineering
Impact of engineering projects on the environment.
Environmental legislation. Regulations and standards (current and proposed).
Health effects. Risk assessment and management.
Physical, chemical and biological sciences and parameters.
Mass balance and natural systems in the environment.
Water quality management.
Water treatment.
Wastewater treatment.
Air pollution and control.
Noise pollution and control.
Solid and hazardous waste management.
Environmental report writing – case study.
Laboratory Experiments in the environmental sciences.

Schedule: Lecture/Recitation- 3 hours per week
Laboratory- 1 hour per week

Professional Component: Engineering Topics
Program Objectives Addressed: 1, 2

Prepared By: Prof. Marhaba **Date:** 08/26/14

Course Objectives Matrix – ENE 262 Introduction to Environmental Engineering

Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Prog. Object.	Assessment Methods/Metrics
Course Objective 1: Provide students with the most relevant environmental regulations and standards; the driving forces behind environmental science and engineering projects.				
Define environmental science and engineering	Understand the role of the environmental scientists and engineers among other engineering disciplines.	f, i, j	1	Homework, class, discussions and examinations.
Explain and discuss current and proposed relevant regulations and standards.	Learn how Federal/State environmental regulations and standards are developed as well as their impact.	i, j	1	Homework and examinations.
Course Objective 2: Provide students with the scientific background needed to assess environmental quality in terms of the physical, chemical and biological aspects.				
Provide an overview of environmental sciences and parameters.	Basic knowledge of reaction kinetics and physical, chemical and biological parameters in environmental pollution.	a, b, e	1, 2	Homework, class discussions, and examinations.
Conduct experiments in the environmental sciences.	Learn how to analyze and understand physical and chemical environmental parameters and processes necessary to engineer systems	a, b, c, d, k	1, 2	Laboratory group discussions and laboratory reports.
Course Objective 3: Provide students with the tools necessary to understand mass balance in environmental systems.				
Illustrate the mass balance approach.	Understand how environmental pollution is assessed using the mass balance scientific approach.	a, b, c, e, k	1, 2	Homework, class examples and examinations.
Course Objective 4: Provide students with the basic scientific and engineering principles of water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.				
Introduce the scientific and engineering principles of water treatment.	Learn how to characterize source water, and the best available technologies (BAT) for physical and chemical treatment of drinking water.	a, b, e, h, j	1,2	Homework, class discussions and examinations.
Introduce the scientific and engineering principles of wastewater treatment.	Learn how to characterize wastewater, and the BAT for physical, chemical and biological treatment of wastewater.	a, b, e, h, j	1, 2	Homework, class discussions, and examinations.
Introduce the scientific and engineering principles of air pollution and control	Learn the common air pollutants, and their pathways, and the various technologies available for control.	a, h, j	1	Homework, class discussions and examinations.
Introduce the scientific and engineering principles of noise pollution and control.	Learn the effects of noise on people and communities, as well as methods of noise measurement and control.	a, h, j	1	Class examples, and examinations.
Introduce the scientific and engineering principles of solid and hazardous waste management.	Learn the regulatory definitions of solid and hazardous wastes, and the methods used to characterize, handle wastes from their source to their final ultimate disposal or reuse.	a, h, j	1	Homework, class discussions, and examinations.

Course Objective 5: Introduce students to environmental report writing.				
Provide the mechanisms of environmental report writing.	Learn the appropriate and inappropriate terminology used in environmental report writing, sources of appropriate data, and write a case study.	a, d, g, h, i, j	1, 2	Class discussions, and case study paper.

CEE Mission, Program Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.
3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, and humanitarian endeavors.

Our student outcomes are what students are expected to know and be able to do by the time of their graduation:
(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as interpret data
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice