

Summer 2019

ENE 262-142: Introduction to Environmental Engineering

Ashish Borgaonkar

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**Department of Civil & Environmental Engineering
New Jersey Institute of Technology**

ENE 262 – INTRODUCTION TO ENVIRONMENTAL ENGINEERING
Section: 142 **Summer 2019**

Instructor: Ashish Borgaonkar, PhD
Office Hours: TBA and by appointment
Room 264, Fenster Hall
(973) 596-3467
ashish.borgaonkar@njit.edu

Lab TA: TBA

General Notes:

Lecture slides, additional notes and assigned papers will be placed on Moodle.
No late assignments accepted without pre-approval

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 | 20% |
| | Final Exam | 30% |
| | Laboratories | 12% |
| | Paper | 15% |
| | Presentation of Paper | 5% |
| | Homework | 13% |
| | Attendance and Class Participation | 5% |

“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on.

As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.

“If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

| Session | 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 |
| 2-3 | -Hydrologic Cycle -Physical, Chemical & Biological Parameter -Researching Published References & Writing Review Papers | Ch.4 Ch.5 |
| 3-7 | -Water Treatment <u>Lab on Alkalinity</u> <u>Lab on Hardness</u> | Ch.6 |
| 8 | <u>Midterm</u> | |
| 8-10 | -Water Quality Management | Ch.7 |
| 10-11 | -Wastewater Treatment <u>Lab on Jar Testing</u> | Ch.8 |
| 11-12 | -Air Pollution & Control -Noise Pollution & Control | Ch.9 |
| 12-13 | -Solid and Hazardous Waste Management | Ch.10 |
| 14 | <u>Paper Presentations & Papers Due</u> | Ch.11-12 |
| TBD | <u>Final Exam</u> | |

Note: There will generally be papers (on topic, but relatively short) assigned to be read prior to class so that they can be discussed in class. Those discussions will be part of the class participation grade.

Course Objectives Matrix – ENE 262 Introduction to Environmental Engineering

| Strategies, Actions and Assignments | ABET Student Outcomes (1-7) | Program Educational Objectives | Assessment Measures |
|---|-----------------------------|--------------------------------|--|
| Student Learning Outcome 1: Describe and discuss relevant environmental regulations ethics and standards; the driving forces behind environmental science and engineering projects. | | | |
| Define environmental science and engineering | 4, 7 | 1 | Homework, class, discussions and examinations. |
| Explain and discuss current and proposed relevant regulations, standards and ethical rules. | 4 | 1 | Homework and examinations. |
| Student Learning Outcome 2: Assess environmental quality in terms of the physical, chemical and biological aspects. | | | |
| Provide an overview of environmental sciences and parameters. | 1, 2 | 1, 2 | Homework, class discussions, and examinations. |
| Conduct experiments in the environmental sciences. | 6, 5 | 1, 2 | Laboratory group discussions and laboratory reports. |
| Student Learning Outcome 3: Illustrate mass balance in environmental systems. | | | |
| Illustrate the mass balance approach. | 1, 2 | 1, 2 | Homework, class examples and examinations. |
| Student Learning Outcome 4: Recognize 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. | 2 | 1, 2 | Homework, class discussions and examinations. |
| Introduce the scientific and engineering principles of wastewater treatment. | 2 | 1 | Homework, class discussions, and examinations. |
| Introduce the scientific and engineering principles of air pollution and control | 2 | 1 | Homework, class discussions and examinations. |
| Introduce the scientific and engineering principles of noise pollution and control. | 2 | 1 | Class examples, and examinations. |
| Introduce the scientific and engineering principles of solid and hazardous waste management. | 2 | 1 | Homework, class discussions, and examinations. |
| Course Objective 5: Practice environmental report writing. | | | |

Provide the mechanisms of environmental report writing.

3

1, 2

Class discussions and case study paper.

CEE Mission, Program Educational 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 educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: 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: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18

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

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 (avg.)
Laboratory- 1 hour per week (avg.)

Professional Component: Engineering Topics

Program Objectives Addressed: 1, 2

Prepared By: Prof. Borgaonkar and Prof. Marhaba

Date: 4/25/2019