

Tuskegee University
Department of Chemical Engineering
CENG 460 – Industrial Pollution and Abatement Processes
Course Outline
Spring 2024

Course Info:

CENG 460, Industrial Pollution and Abatement Processes, 3 credit hour lecture
Time 12:30 PM - 2:00 PM, TTH; Room: 528
Office hours: MW: 9:00 -12:00; 1:00 -2:00 and T: 10:00 -12:00

Instructor:

Dr. Shamim Ara Begum
Office: Room 522E Luther Foster Hall
Office Phone: 727-8795
Email: sbegum@tuskegee.edu

Catalog Description:

Industrial wastewater treatment processes for organic & inorganic removal; industrial air pollution problems and abatement techniques, sulfur dioxide pollution from high temperature processes, treatment methods, air particulate generation and removal processes, treatment of radioactive wastes from uranium processing, mining and processing industry wastewater treatment, acid mine drainage from coal and hard rock mining and processing, cyanide removal from wastewater, land reclamation.

Prerequisites:

CENG 450 – Environmental Engineering Fundamentals

Main Textbook

Introduction to Environmental Engineering, 1st Edition, by Richard O. Mines, Jr. and Laura W. Lackey

Publisher: Pearson Education Inc. (2009).

ISBN: 978-0-13-234747-1

Other References

1. Introduction to Environmental Engineering, 3rd Edition, by P.A. Vesilind, S.M. Morgan, L.G. Heine

Publisher: Cengage Learning-Engineering/ Thomson: Brooks/Cole, (2010).

ISBN-10:0-495-29583-3, ISBN-13:978-0-495-29583-9

2. N. O. Egiebor, An Introduction to Industrial Pollution Processes & Treatment Methods in Chemical and resource Industries. A bound pre-publication lecture notes (2009)

Course Objectives:

This course builds on the environmental engineering skills and principles taught in the CENG 450 course. The course will be taught with multiple problem examples to illustrate the environmental engineering applications of fundamental science and engineering principles. At the conclusion of the course, students should have acquired the following skills:

1. Engineering principles and design of industrial and municipal wastewater treatment systems.
2. An understanding of the chemical and physical principles used for analyzing high temperature industrial operations and the design of airborne particulate removal equipment
3. Evaluate the parameters of solid waste management and consider the impacts and designs on the end-of-life management options.
4. Define hazardous waste and analyze the concepts for the hazardous waste management
5. Analyze and understand the chemical and physical parameters used in contaminated soil reclamation activities.

Course Outcomes:

Outcomes	1	2	3	4	5	6	7
Objective 1	X		X				X
Objective 2	X						
Objective 3	X						
Objective 4	X						
Objective 5	X						

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 solutions and make informed judgements, 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 judgement to draw conclusions.

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Grading and Other Policies:

- Effective Spring 2018, the **outlook 365 (tuskegee.edu)** email system at Tuskegee University is REQUIRED for all instructional administrators, faculty, staff and students.
- It is critical that all homework, quizzes, term paper/design and exams be completed on time. If you are unable to attend a class or take an exam, it is your responsibility to present an excuse to your instructor. Valid excuses include serious illness, death in the immediate family, and participation in the University-sponsored events. Any other excuse will be evaluated by the instructor. An excused absence allows you to make up any work you missed without any late penalties. Excused students are required to complete any missed work within one week of their return to class. If the students miss the makeup exam, they must show the written valid excuse to makeup it again. It is the student's responsibility to meet with the instructor to submit the missed work for an excused absence. An unexcused absence means that any work (homework/design report) you missed can be turned in for 25% deduction within one week of the due date.
- Students need to submit all assignments (homework, term paper/design etc.) by themselves. They should not give their assignments to another student to submit to the instructor. The instructor will not accept this type of submission.
- Short quizzes will be given at the normal class time; the quizzes may or may not be announced.
- Students are expected to be in the class on time. The student is expected to attend the class within 5 minutes after time for class to start. If not, the student will be given a zero in attendance for that day. If a student is late to class by 10 minutes or more, the instructor reserves the right to turn the student away to minimize disruption of the ongoing class. It is students' responsibility to check whether their attendances have been recorded by the instructor.
- No children or siblings of students will be allowed in class during lectures.
- Homework and term paper/design will be assigned in the CANVAS or in the class. Hard copy of the completed homework needs to be submitted to the instructor at the beginning of the class on the due date. Completed term paper/design needs to be submitted on the CANVAS/Class on the due date. Completed term paper/design needs to be presented in the class using the PowerPoint on the due date.
- **Students are required to use Tuskegee email (outlook 365) for all communications with the instructor.**
- Students are responsible to check the CANVAS regularly for any assigned tasks and announcements.

- Cheating will not be tolerated. Any student caught cheating will get a zero for that homework, term paper/design, quiz and exam.
- Students are not allowed to talk with each other during lecture, quizzes, exams, and final exam.
- Students are not allowed to do other class work during this class.
- No electronic devices (cell phone, iPad, laptop etc.) except calculator will be allowed during class time, quizzes, exams, and final exam.
- Additional policies will be issued, if they are necessary.
- Final numerical grades will be determined using the following weighting:

Three class Exams (One Mid-Term Exam)	40%
Homework	5%
Term Paper/Design (Reports and Presentations)	15%
Class Attendance, Participation & Quizzes	15%
Final Exam	<u>25%</u>
Maximum Possible Score	100%

Final Grades:

Final numerical grades will be awarded for cumulative percentage scores as follows:

- A = 90 – 100%
- B = 80 – 89%
- C = 70 – 79%
- D = 60 – 69% (This is a failing grade in the College of Engineering)
- F = 59% and lower (Failing grade everywhere)

Dress Code:

Tuskegee University has implemented a dress code for students, faculty, and staff on campus. The dress general code is “**Business Casual**”. Students are required to adhere to this dress code in the classroom. Any student violating the dress code will be asked to leave the classroom, and such student(s) cannot return to class until they are properly dressed. The following are basic requirements of the dress code:

1. Jeans and T-shirts cannot be worn to class unless on Fridays.
2. No head gear, hats, or head covers unless it is required under special circumstances.
3. No sagging or wearing of dark sunshades in class
4. **Any outfit that will inappropriately expose body parts is unacceptable.**
5. **Sando genji is not allowed in the class.**

COVID Policy:

“Excuses related to Covid infection as well as exposure have to be received from the Dean of Students office. Students should request the excuse for absence from the Dean of Students office as soon as they become aware of covid infection or exposure. Students may request a classes missed memo by completing this form (<https://forms.gle/4ozusHX2tTCUW4yK6>) and then contact the Office of the Dean of Students and Student Conduct (334) 727-8421, via e-mail THarper@Tuskegee.edu or by going into the office located in suite 203 Tompkins Hall.”

Course Schedule:

Wastewater Treatment (Week: 1-4)

Exam #1*

Air Pollution (Week: 5-7)

Exam #2*

Introduction to Solid Waste Management (Week: 8-9)

Fundamentals of Hazardous Waste Site Remediation (Week: 10-11)

Sustainability and Green Development (12-13)

Exam #3*

Environmental Impact of the Hydrometallurgical Extraction of Uranium (Week: 14)

Soil Reclamation (Week: 15-16)

Final Exam: Date will be announced by the university

Note: *Tentative

STATEMENTS OF COE EXPECTATIONS REGARDING STUDENTS' ACADEMIC PROFICIENCY

Academic excellence is a tradition of the Tuskegee University College of Engineering, (COE). Students and faculty must collectively and proactively guard this tradition. The college hereby renews its commitment to the tradition by stating as follows:

1. Students are expected to develop self-confidence through acquisition of in-depth knowledge in all subjects through, as a minimum:
 - a. Studying to understand rather than studying to get by.
 - b. Challenging oneself to solve problems independent of textbooks or formulae sheets
 - c. Attempting diverse and multiple problems, multiple times, for depth and breadth of knowledge
2. Students are expected to be self-motivated through setting their own goals & schedules, spending time to study, and sharing their knowledge with peers.
 - a. Students should invest a minimum of two hours of study-time per week for every credit hour taken.
 - b. Students should seek or establish environments that encourage positive social interaction and engages in active learning.
3. COE is committed to providing support systems to students for higher achievement through the following avenues:
 - a. Direct access to instructors
 - b. Archives of faculty recorded course lectures

- c. Dedicated peer tutors by fellow students at all academic levels
 - d. Periodic visits by alumni and industry subject matter experts
 - e. Opportunities for local and national academic related competitions
4. All COE students are expected to take advantage of all support systems. Students are particularly expected to adopt the notions of “self-confidence through knowledge acquisition” and “self-motivation to bring out best in self” as the COE fundamental culture for success.