SYLLABUS – EM & EGR 518
ENVIRONMENTAL COMPLIANCE FOR FACILITIES ENGINEERS

Days and Dates:	**Mondays from 3:00 pm to 5:45 PM, January 6 to April 21 with final exam to follow on Wednesday April 30, 2024 from 3:30 to 6:00 pm.**
Time:	2.75 hours (including 15 minute break) once each week
Location:	Physical classroom Monteith Research Center (MRC) Room 313, with live-stream and recorded lectures for Distance-Ed students

INSTRUCTOR

James A. Rispoli, M.S. (Civil Engineering), M.A. Business, P.E.
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Office Hours: 1:00-2:30 pm, Mondays, prior to each class session. Other times by appointment. Opportunities for telephone discussion or FaceTime/Google Duo chat with individual students can be arranged by email.
Office location: Fitts Woolard Hall, Room 3210.

Mr. Rispoli served as Assistant Secretary of Energy for Environmental Management for four years, and earlier served as Assistant Commander for Environment, Safety and Health in the Naval Facilities Engineering Command.. He has held installation-level positions as Director of Facilities Engineering, Environment and Public Works, and led several major engineering firms in their practice of environmental engineering.

COURSE OVERVIEW

Facilities engineering is an application of multidisciplinary engineering and management required to effectively manage the technical aspects of a large inventory of physical assets. Practitioners include city engineers, town engineers, and university facilities engineering organizations, governmental installations at the federal and state level, port authorities, utilities installations, and manufacturing plants. The student who aspires to Facilities Engineering must know how to research the various environmental laws and regulations, interpret them, and employ engineering approaches to comply, avoid issues with engineering ethics, and understand legal aspects of non-compliance.

All of types of installations organizations conduct operations, maintenance, repair and construction activities which are subject to environmental regulation. There are literally thousands of such regulations spread across Federal, State, and local jurisdictions, and the Facilities Engineer must be aware of compliance aspects, and from an engineering perspective, how to comply with the regulations. This may very well be the only aspect of engineering where an individual can be held to not only civil, but criminal liability, for acts committed, or allowed to happen, without willful intent, and be in violation of law and regulation.

To effectively manage environmental programs at any level (installation, or higher/corporate levels) one must understand the physical environment, and how to perform operations, maintenance and construction activities avoiding or minimizing negative effects on the environment. This involves an understanding of the physical world, such as geology, air, and water, and application of engineering solutions to avoid or minimize discharges and emissions that harm the environment. The course will provide the student with an understanding of the engineering approaches across the spectrum of potential emissions and releases to prevent, treat, or sequester harmful discharges and emissions.

COURSE OBJECTIVES

This course is intended to provide engineers working in Facilities Engineering organizations, or aspiring to work in such organizations, with the engineering knowledge and the management tools to improve their effectiveness as an engineer leader or manager, or experienced engineer. This course will teach the student the breadth of environmental regulation across all the media that can be expected for an owner's Facilities Engineer, as well as for consultants, engineers and contractors who support the owners at their installations. The objectives include understanding of, and application of, engineering solutions to protect the environment and comply with environmental regulations.

READINGS

Required Text

Fundamentals of Environmental Law and Compliance, Daniel T. Rogers; CRC Press 2023

Instructor Source Text (recommended for reference – library)

Handbook of Environmental Engineering, Rao Y. Surampalli, Tian C. Zhang, Satinder Kaur Brar, Krishnamoothy Hegde, Rama Pulicharla, and Mausam Vermal; McGraw Hill 2018. This book can be obtained in the NCSU bookstore, or from on-line sources new and used.

Other Reading Materials
Supplemental reading on relevant issues will be required throughout the course. Case studies will be assigned and provided electronically, or by reference to on-line sources.

ASSIGNMENTS

Readings
Readings, primarily from the required textbook, and also from other sources (such as on-line readings), will be assigned; these are to be completed before the class session that is designated. Reading assignments are shown in the accompanying Course Schedule, and will be augmented with other readings as announced beforehand.

Homework

Written homework assignments will consist of case studies of actual situations such that the student can demonstrate understanding of the lecture material. There will be 6 such homework assignments throughout the semester and each must be submitted according to the dates shown in Table 1, the Course Schedule. It is intended that these will be either three-person team assignments, or individual assignments (TBD). The instructor will discuss the options during an early class session. The purpose of each will be for the students to demonstrate understanding of the applicable regulatory regime, and application of engineering approaches and solutions that could have been used to prevent or mitigate the actual circumstances encountered in current and recent real-world case studies. *NOTE: All assignments will be graded on communication skills as well as content.*

TESTS

In order to demonstrate mastery of the course material, there will one mid-term exam during normal class time given by the instructor. The material in the course builds upon itself; thus, the student will need to be familiar with material from the mid-term exam in order to successfully complete material on the final exam. The final exam will be conducted on the days prescribed by the NCSU academic calendar.

The mid-term exam and final exam are open book/open notes with access to the internet permitted since factual case studies taken from public records are included in the course of study.

The mid-term exam will be during class times according to the dates in Table 1, which is the Course Schedule**. The final exam will be administered on the date assigned for the final by the University, which is Wednesday April 30.** For Distance-Ed students, each exam will be proctored, and a minimum two-day window will be available.

EGR 590 COURSE GRADES

The overall course numerical grade will be calculated based on a weighted average as follows:

Student participation		5%
Case Studies	(6)	45%
Mid-term exam	(1)	20%
Final		30%

Final course numerical grades will be rounded to two decimal places for assigning letter grades. Letter grades assigned will be no lower than:

A+ (97-100)	A (93-96.99)	A- (90-92.99)
B+ (87-89.99)	B (83-86.99)	B- (80-82.99)
C+ (77-79.99)	C (73-76.99)	C- (70-72.99)
D+ (67-69.99)	D (63-66.99)	D- (60-62.99)
F (less than 60)		

POLICIES AND PROCEDURES

Professionalism
Each student is expected to conduct themselves in a professional manner. This includes, but is not limited to being respectful of the instructor and other students, and participating in group activities and discussions if applicable.

Furthermore, oral and written communication with the instructor and other students is expected to be at a professional level.

Late Assignments
Unless agreed upon with the instructor prior to the assignment due date, late assignments will not be accepted without assessment of a penalty for being late.

All assignments are due on a Friday by end-of-day, or as otherwise indicated, as shown in this Syllabus, and on Table 1, Course Schedule. If an assignment so due, is submitted late, a maximum of 50 percent will be earned for that assignment.

If it is necessary to submit a late assignment, please discuss the situation with the instructor as soon as possible; the instructor will evaluate each situation on a case-by-case basis.

Re-Grading of Assignments and Exams
If the student feels that a portion of an assignment or exam has been unfairly graded by the instructor, the student may re-submit the assignment or exam to be re-evaluated by the instructor within one week after it was originally returned to the student. However, the instructor reserves the right to re-grade the entire assignment or exam, and not just the portion that is in question by the student. Thus, it is possible for the student to receive a revised final grade that is lower than the grade that was received originally.

Academic Integrity
It is the instructor's expectation that each student will neither give nor receive unauthorized aid on any assignment. In assignments or on exams, if source material is used, it is mandatory that credit and/or reference for that material be indicated. Students may discuss the homework assignments if they wish but each student (or student team) is expected to submit their own

original work in their assignments. For the tests in this course, use of the text book, course notes, other material and access to the internet are allowed unless otherwise specified by the instructor. Additional information regarding academic integrity may be found in the NC State University Code of Student Conduct, at https://studentconduct.dasa.ncsu.edu/code/

While the integration of Artificial Intelligence (AI) in your learning experience is acceptable, there are certain uses of AI that are not permitted in this course:

- **Cheating and Academic Dishonesty:** Using AI to plagiarize or produce work without proper attribution is strictly prohibited. Per the Code of Student Conduct, all work submitted must be your original creation, with appropriate citations when referring to external sources.
- **Unauthorized Assistance:** Do not use AI to access unauthorized materials or solutions during examinations, quizzes, or other assessments. Any form of unauthorized assistance is a violation of academic integrity.
- **Malicious Intent:** Do not use AI for any activities that may cause harm or compromise security.

With that said, the use of AI to assist in finding and even interpreting issues related to our course material, or assignments, can be useful. When you do so, in any of your assignments, it would be ***important to provide a reference to the source material that AI assisted you to locate.***

Students with Disabilities
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the NC State University's web site that provides for Academic Accommodations for Students with Disabilities, at https://dro.dasa.ncsu.edu/enrolled-students/

REQUIREMENTS AND SUGGESTIONS FOR A SUCCESSFUL SEMESTER:

Participation:

- On-campus:
  - If you are physically present in the classroom, you don't need to reply to any "participation questions."
  - Your participation will be gauged by classroom attentiveness, interaction (when appropriate such as discussion periods).

- Distance-ed:
    - You will need to respond to any "participation questions" I ask during the lecture. I will clearly state that this is a "participation question."
    - If there is no email response by the start of the next scheduled lecture, there will be a minus 0.5 recorded.
    - You can make up half of the minus 0.5 by completing an assignment provided by the instructor.

Homework Assignments:

- Six case studies to be done by student-teams.
- Student teams will be four students each, and students form their own teams. Please send me an email just prior to the third class session.
    - The team can be all on-campus, all distance-ed, or a mix.
- You are encouraged to use a spell checker for your paper, and also for the PPT "talking notes" for me to read (these are mandatory).
- Include references at the end of your PPT presentations.

Things NOT PERMISSIBLE:

- Do not use AI tools to write, or help write, your homework assignments. Spell and grammar check software is OK.
    - If evidence is found of "copy and paste" or AI, a ZERO will be assigned.
- DO NOT POST LECTURE NOTES OR HOMEWORK ASSIGNMENTS ON AN OPEN WEB SITE, OR ON SOCIAL MEDIA. ALL MY LECTURES ARE "OWNED" BY AND COPYRIGHTED
    - So you violate the law if you post any of these – these are for class use only.
    - Violations of this constitute a violation of the Academic Integrity Policy and will be reported.
    - If you have a legitimate need to share course materials such as these, ask and "permission" to do so will be considered.

Academic Integrity and Course Grade

- When collaboration is allowed, when it is not
    - Team assignments – collaborate
    - Quizzes or exams are required as the major contributor to course grade. These are to be done with no collaboration, no sharing of notes, entirely your own work.
    - Academic integrity – quizzes and first assignment must be your own work.
    - Past experience – lack of academic integrity was not a positive outcome for several students.
- Grading standards for course grade
    - Syllabus gives the breakout in detail.
- Policy regarding late assignments – max of 50 percent

- Unless there is a valid reason discussed with the instructor in advance. Valid reasons do not include optional activities, social events, discretionary travel.
- Valid reasons include things like family emergencies, sickness, unexpected work requirements (especially pertinent for distance-ed students).

Specific MEM Guidance:

- **Academic Integrity.**
- Zero tolerance for students who
  ...receive unauthorized aid from others/internet on graded events.
  ...give unauthorized aid to others/internet regarding graded events.

...fail to provide proper attribution for help received (plagiarism).
...post course materials online without instructor permission.

All students should read https://studentconduct.dasa.ncsu.edu/academic-integrity-overview/

- **Best Practices: (do these things!)**

1. *Show up – attend the class sessions*
2. *Pay attention – to the lectures, and to the case studies presented in class*
3. *Participate in class discussions so we can learn from each other*
4. Ask your instructor what is permissible for each assignment if it is unclear.
5. When in doubt, disclose any and all assistance received.
6. Never post course materials to the internet without written permission from the instructor.
7. Do not share, text, or email course materials with students outside the course without permission from the instructor.
8. Do not complete a sign-in attendance roster for anyone other than yourself.

- **Amnesty Opportunity:** If you have a CourseHero account and/or you have posted materials to this site, or similar sites, remove all content immediately.

Grading for Homework Assignments:

- Follow the instructions given for each. Be sure to cover, that is, include, all the requirements.
- ***Case studies will be graded*** on content, covering and explaining the required components as per the instructions given.
  - And also ***INDIVIDUALS will be graded*** on their contribution:
    - Presentation of case studies should include all team members.
    - DO NOT READ US ALL THE "TALKING NOTES" – I use these for grading.
    - You know the material – you did the work, so talk about it without reading it.

        - When we watch the recorded lecture, it is important that you are heard!
    - Team grading matrix – will not "hurt" anyone, but can help.
        - Examples of past mis-use.
        - Mis-use or not following guidance can result in a "missed assignment" grade.

Attendance at Lecture Sessions

- The semester is 16 weeks long; because we meet only Mondays, we will miss TWO 2.5 contact hours of class. This would be like missing two entire weeks of a three time per week class!
- There will be an "optional" visit to a nearby site that involves environmental compliance. Those who attend will earn an additional "0.5" towards course grade. This is basically making up for one week of a missed lecture.
    - There will be an option for those who can't make the optional site visit.
    - This includes both on-campus and distance-ed students.
- IF YOU ARE SICK, OR THINK YOU MAY BE SICK
    - **PLEASE DO NOT COME TO CLASS**
    - There will be no penalty if you let me know PRIOR to the start of the lecture
        - You will just need to respond to the "participation question(s) in that lecture
- IF YOU MISS A CLASS WITHOUT PRIOR NOTIFICATION
    - There will be a "minus 0.5" participation towards course total
    - You can make up 0.5 point by doing an assignment provided by the instructor – typically a three page paper on a specific subject provided

Class Session One – Monday (January 6)
Final Class Session – Monday (April 21) (on campus classes & recording dates)

Refer to the Course Schedule for content of each lecture, assignments given, and assignments due. Note: There is one guest lecture scheduled during the same class session as the window for the mid-term exam.
Opportunities to discuss any questions on assignments are available, either during class time, or during office hours as described above.

Learning Objectives:
At the conclusion of each lecture, and the accompanying case study (as may be applicable) the student will demonstrate understanding of the regulatory regime and requirements for that particular topic, the engineering aspects of compliance with those requirements, and the potential consequences on the facility, plant, installation, campus, municipality or medical complex for failure to comply with legal and regulatory requirements. This will be accomplished through a combination of discussions, email communication, and the case studies. Through the case study method, the student will demonstrate understanding of the regulatory regime for the applicable media (air, water, soil, etc.) and describe and explain the engineering solutions that could have been, or could be applied, to correct the issue and bring the facility into a state of environmental compliance.

Course Content:

1. The environmental compliance assessment and environmental compliance plan. This is the first step for the Facilities Engineer – to assess the environmental requirements derived from applicable Federal, State and local saws, for their installation, determine status of compliance, and develop a plan to be in compliance. This latter plan generally requires coordination with the appropriate regulatory entity.
2. Surface water. Virtually all installations (to include towns and municipalities) will have surface water in the form of stormwater, and it is important to understand that there are best practices to manage it. In addition, maintenance and construction activities can generate surface water runoff. We will study typical environmental regulations pertinent to surface water. Sanitary sewage is regulated by the same set of laws and regulations regarding discharge to surface waters, including rivers, lakes, and ocean outfalls. The student will learn and understand the engineering aspects to process and treat any discharges, both to protect the environment and human health, and to comply with environmental regulations. The entire range of surface water issues will be included in the course material.
3. Groundwater. Protection of groundwater is of concern, especially related to ongoing maintenance of facilities as well during construction, since pollution can be

created during such activities, and thus affect groundwater. The student will learn the geology of aquifers and the movement of groundwater, as well as the fragility of aquifers and engineering methods employed to protect groundwater quality, or restore it if previously contaminated.

4. Drinking Water. Installations and municipalities situated near reservoirs or rivers which can be sources of drinking water can affect those bodies of water by every day operations and maintenance activities. Additionally, many Facilities Engineers have responsibility for production, and/or distribution and delivery of drinking water. The student will learn and understand the engineering aspects to process and treat water intended for consumption, both to protect the environment and human health, and to comply with environmental regulations.
5. Air. This is a ubiquitous subject, since air emissions can result not only from physical plant operations (generators, heat plants) but also by the facilities engineer's mobile equipment and on-road vehicles. Additionally, process activities on the installation or factory/plant could involve emissions by design. The student will learn and understand the engineering aspects to monitor and treat such emissions, both to protect the environment and human health, and to comply with environmental regulations. This would include not only products of combustion and other processes, but also dust created by maintenance and repair activities.
6. Hazardous Waste (HW) Management. This area can be complex in that it is highly regulated by overlapping laws and their attendant regulatory regimes. The student will learn and understand that a typical installation could activities that generate Hazardous Waste. Presuming this is the case, there will be Hazardous Waste collection points and storage areas that are permitted under environmental laws and regulations. The installation would also have a Hazardous Waste packaging and shipping (transfer) activity, and may also have HW treatment facilities. The student will learn and understand the engineering and management aspects to safely collect, store and ship such hazardous wastes safely, both to protect the environment and human health, and to comply with environmental regulations.
7. Contaminated Soil and Groundwater Remediation. Building on the knowledge gained by the student in #3 above, this segment will discuss "legacy" contamination, which is regulated under a specific set of environmental laws. Any installation that has functioned for a period of time is likely to have contamination from past operations. This contamination is likely subject to regulation and an environmental clean-up process. The laws may vary State by State; the Federal law categorizes the most severely contaminated sites as "National Priority List" sites, which then has a specific set of regulatory requirements under Federal law.
8. Toxic and Hazardous Substances Control. Day to day operations often entail use of toxic substances that can affect the workers and the public. This topic is regulated in several regimes including environmental laws and regulations, and occupational safety and health regulations. The student will learn and understand methods to safely utilize hazardous substances within the plant or installation, and how to

conduct operations safely and in a compliant mode. Furthermore, substances such as lead (lead-based paint), PCBs such as used in various electrical and hardware applications, asbestos, such as in insulation, flooring and roofing are regulated by several related laws and their pertinent regulations. The student will learn and understand the engineering and operational aspects to safely handle these various substances, both to protect the environment and human health, and to comply with environmental and occupational safety regulations.

9. Storage Tanks. Current regulations apply to both buried tanks, and above ground tanks, including secondary containment. The Facilities Engineer must have both physical capability for containment (secondary containment) for above ground tanks, and response plans should there be an unintended release. The contents could be petroleum products, or other substances that would have environmental impacts. The student will learn and understand the engineering aspects applicable to the construction and configuration of both buried and above ground tanks, and maintenance engineering to protect the environment and human health, and to comply with environmental regulations.
10. Archeological, Cultural and Biological Resources. Many installations and municipalities have archeological and/or cultural resources. For example, the Facilities Engineer may be subject to oversight and regulation by the State Historic Preservation Officer (SHPO) concerning maintenance and preservation of historical facilities under their purview, even facilities that are operational and functioning. Such laws do not necessarily require that the facility(ies) be "listed" on the National Register of Historic Places, but rather that they are either "listed" or "eligible" for listing. Thus operations and engineered maintenance and repairs could be subject to specific State laws and regulations.
    Furthermore, the installation or property (properties) may have endangered species of flora, fauna and/or wildlife, and there might be implications and requirements for coastal zone areas. Such considerations could impact ability to perform operations, maintenance or repair activities during certain times and seasons, such as nesting season. The student will learn and understand the engineering and/or architectural activities that could impact both facilities and the natural environment, and engineering and management approaches that can be taken to protect the environment, and to comply with this set of environmental regulations.
11. National Environmental Policy Act (NEPA). This law, and related laws, apply to planning for public sector facilities, as well as facilities projects that include Federal funding and/or permits by a Federal Government entity. Primarily a process to evaluate planning and engineering alternatives and engage the public, there can be significant ramifications (injunctions, etc.) for failure to comply with this law. In addition, States may enact similar legislation which applies the same or similar requirements as does NEPA. Environmental Justice will also be discussed.
12. Other Federal and State Laws and Regulations. Even the Federal laws alone are too numerous to enumerate, but a short list follows. Added to this list are numerous,

and varying State and local laws and regulations. The student will learn and understand the applicability of these laws and their attendant regulatory requirements, and the engineering aspects that can be addressed, both to protect the environment and human health, and to comply with environmental regulations. Such laws include:

a. Native American Graves Protection and Rehabilitation Act
b. Asbestos Hazard Emergency Response Act
c. Federal Insecticide, Fungicide and Rodenticide Act
d. Federal Facilities Compliance Act
e. Oil Pollution Act of 1990
f. Coastal Zone Management Act
g. Radon, PCBs, lead, noise regulations
h. Community Right to Know laws

FINAL WEEK OF CLASSES

Class Session April 21

Lecture:
Today's topic will be a course wrap-up and review for the final exam. The instructor will recap all applicable areas of the course, to provide a refresher on materials covered from the first through the most recent lectures.

FINAL EXAM – Wednesday of the next week, April 30, 2025 at 3:30 pm. This date is assigned by the University and cannot be changed, so be sure to plan any travel accordingly.