

NORTH CAROLINA STATE UNIVERSITY
ELECTRICAL AND COMPUTER ENGINEERING

ECE 585: The Business of the Electric Utility
Fall 2024

1. Instructors:

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Office location: room 30, Keystone Science Center/FREEDM Systems Center

Office hours: available most days Monday through Thursday, by appointment at this link:
[office hours meeting request](#)

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2. Class Lectures:

2.1. On campus students: Tues/Thurs, 4:30 pm – 5:30 pm, held in 00136

Monteith Engineering Research Center Building (MRC)

2.2. Engineering Online students: online, asynchronous

2.3. A course schedule is available on the Moodle site.

3. **Moodle** will be used for course administration for both on-campus and Engineering Online students.

4. Course Description:

This course explores how the electric utility industry evolved, the structure and business models of the industry, the regulatory structures within which the utilities operate, the operations of the utility industry, and the current policy and emerging technology issues facing the business.

5. Student Learning Outcomes:

Upon completion of this course, the student will be able to:

- Understand the nature of a “natural monopoly” and how that has defined and influenced the utility industry
- Identify and differentiate the regulatory bodies governing the electric utility industry
- Describe the primary business models of the industry and explain how an electric utility makes money
- Understand utility financial concepts such as utility revenue requirements
- Understand residential, commercial, industrial, and wholesale rate schedules
- Understand “time value of money”/engineering economics concepts and how these are used in the utility context
- Perform cost benefit analysis for utility projects
- Understand the differentiation between capital and O&M expenditures in the utility context

- Describe utility planning processes – and regulatory processes – for generation, transmission, and distribution, and describe utility risk management concepts
- Describe utility asset management concepts and how to implement them
- Describe the conflicts and challenges of interconnecting distributed resources in the midst of utilizing conventional utility planning models

6. Textbook References:

- 6.1. R.E. Brown, *Business Essentials for Utility Engineers*, CRC Press, 2010
- 6.2. William L. Thompson, *Living on the Grid: The Fundamentals of the North American Electric Grids in Simple Language*, IUniverse Inc., 2016

7. Grading

7.1. On Campus students*

Homework	30%
Midterm exam	35%
Final exam	35%

* Note the attendance policy below, and the potential impact on course grading.

7.2. Engineering Online students

Homework	30%
Midterm exam	35%
Final exam	35%

8. Class Attendance for On-Campus students

This class is designed to be as interactive as possible, for the benefit of all students. On-campus students are expected to attend in-person and to actively participate in all class discussions.

Attendance will be taken at the start of each on-campus class period. We will use the Moodle QR code generator, and the QR code will be displayed on the classroom screen before the start of class and up to the start time. Using the QR code at the start of class will result in being recorded as “present.”

Up to three absences will be permitted without any grade impact.

To calculate a potential grade impact for absences, the number of absences (in excess of three) will be divided by -300, and the resultant value included in the course grade totals. (Example: end of course grade of 90.0%, adjusted for 10 unexcused missed lectures: $(10-3)/-300 = -2.33\%$, resulting in an adjusted course grade of 87.67%.) Another way to say this: if you miss all 27 lectures, it will result in an 8% deduction in your final grade.

If a student arrives late to class, after the QR code is no longer displayed, this will result in a recorded absence. If the student emails me during the first 10 minutes of class (by 4:40pm), the absence will be reversed.

If a student has any specific issue regarding their ability to attend class on-time or to attend at all, they should contact me individually to discuss.

9. HOMEWORK

9.1. Regular Homework Assignments

Homework will be assigned every one to two weeks.

For written homework: Since this class is a concept and sometimes writing intensive class, sometimes there may be no posted "solutions" for such assignments. Writing assignments will be graded by the instructor according to the student's ability to clearly and succinctly answer the given question with the correct concepts. We will always discuss the assignments after they have been turned in, so students are able to gain full clarity on the concepts addressed by the homework. Because the homework is discussed in class soon after it is due, late homework submissions will generally not be accepted.

9.2. Total homework grade and missed homework

If a student is not able to complete any assignment, the student should contact the instructor to let him know. If the student is not able to complete more than two homework assignments, the student and instructor will discuss the student's situation in order to determine a resolution which is consistent with NC State policies.

10. EXAMS

A mid-term exam and final exam will be administered to the class. Only the University-approved reasons will be accepted for missing an exam. Refer to this link for additional information: http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php

The Mid-term and the Final Examination will be open-book and open-notes with the only restriction being that all work must be done by the individual being tested. A compliance statement will be required, attesting that the student has complied with all exam restrictions.

11. Academic Integrity

Work in this course is expected to always be the student's original work and is to be done under the Academic Integrity Honor Pledge: "I have neither given nor received unauthorized aid on this test or assignment."

Students must abide by the Code of Student Conduct articulated at:

<https://policies.ncsu.edu/policy/pol-11-35-01/>

Evidence of copying or any other use of unauthorized aid will be investigated and potentially referred to the University judicial system as a violation of the *Code of Student Conduct*.

The *minimum sanction* for a violation is a zero on an assignment. Recycling of work from another resource will be considered an academic integrity violation.

12. 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, (919) 515-7653. For more information on NC State's policy on working with students with disabilities, please see:

<https://policies.ncsu.edu/regulation/reg-02-20-01/>

13. N.C. State University Policies, Regulations, and Rules (PRR)

Students are responsible for reviewing the PRRs which pertain to their course rights and responsibilities. These include the following:

- 13.1. <http://policies.ncsu.edu/policy/pol-04-25-05> (Equal Opportunity and Non-Discrimination Policy Statement)
- 13.2. <https://diversity.ncsu.edu/policies/> (Office for Institutional Equity and Diversity)
- 13.3. <http://policies.ncsu.edu/policy/pol-11-35-01> (Code of Student Conduct)
- 13.4. <http://policies.ncsu.edu/regulation/reg-02-50-03> (Grades and Grade Point Average)

14. Additional Health and Well-Being Resources

Always take care of yourselves and also be aware of the well-being of your peers. If you need additional support, there are many resources on campus to help you:

- NCSU Counseling Center (<https://counseling.dasa.ncsu.edu>)
- Student Health Services (<https://healthypack.dasa.ncsu.edu>)
- If the personal behavior of a classmate concerns or worries you, either for the classmate's well-being or yours, we encourage you to report this behavior to the NC State CARES team: (<https://prevention.dasa.ncsu.edu/nc-state-cares/about/>)
- If you or someone you know are experiencing food, housing or financial insecurity, please see the Pack Essentials Program (<https://dasa.ncsu.edu/support-and-advocacy/pack-essentials/food-and-housing-resources/>)

If you find yourself in a place where you need help, academically or otherwise, please review these resources:

- Keep Learning: <https://dasa.ncsu.edu/academics/keep-learning/>
- Academic Success Center (tutoring, drop in advising, career and wellness advising): <https://asc.dasa.ncsu.edu/>
- Introduction to Zoom for students: <https://delta.ncsu.edu/learning-technology/instructional-tools/zoom-at-nc-state/>
- Learning with Moodle, a student's guide to using Moodle: <https://delta.ncsu.edu/learning-technology/instructional-tools/moodle/>
- NC State Libraries Technology Lending Program: <https://www.lib.ncsu.edu/devices>