CEE 4160 Syllabus

Smart and Sustainable Cities, CEE 4160, 3 Credits
Fall 2026

Instructor Information

Instructor	Email
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General Course Information

Description

This course examines city infrastructure systems and impact on urban sustainability. It further explores the role of smart technological solutions to address mounting urban sustainability challenges.

Course Learning Outcomes

Upon successful completion of this course, you should be able to:

- **Explain** the principal components of sustainability and how they can be applied to engineering projects and the United Nations Sustainable Development Goals (UN SDGs).
- **Explain** the role that cities play in broader society and how to identify and forecast key demographic and population trends.
- **Identify** critical urban infrastructure systems.
- **Calculate** energy use and greenhouse gas emissions of urban infrastructure systems.
- **Apply** course skills in a group project to develop a neighborhood design which incorporates key infrastructure systems, population demands, and addresses the UN SDGs.

Required Course Materials

Below lists the required course material(s):

TEXTBOOK (required):

Derrible, S. (2019). *Urban Engineering for Sustainability*. MIT Press.

BOOK CHAPTER (required):

Bozeman, J.F., Mulrow, J., Derrible, S., and Theis, T.L. (2021). *Urban Carbon Management Strategies* (Chapter 13 of the book titled "Advances in Carbon Management Technologies"). *CRC Press*. 2, 229-249.

* A pre-print version of this book chapter will be provided to students at no cost via https://canvas.gatech.edu

SUPPLEMENTARY READINGS (optional):

- Theis, T. and Tomkin, J. (2012). "Sustainability: A Comprehensive Foundation". OpenStax CNX. Open-Source Textbook.
- Fox-Penner, P. (2010). "Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities". Island Press.
- Lindeburg, M.R. (2003). "Environmental Engineering Reference Manual for the PE Exam". Second Edition. Professional Publications, Inc.
- Çengel, Y.A. (2007), "Heat and Mass Transfer: A Practical Approach". Third Edition. McGraw Hill.
- Capehart, B.L., Turner, W.C., and Kennedy, W.J. "Guide to Energy Management". Sixth Edition. The Fairmont Press, CRC. Taylor and Francis.

Grading Policy:

This course is 3 credit hours, where your anticipated time commitment is an average of 9 hours of in- and out-of-class work each week.

ASSIGNMENTS AND GRADED COMPONENTS:

1. Attendance and Participation: 5%
2. Exam 1: 30%
3. Homework (Best 8 out of 9): 25%
4. Group Project: 40% (Please see below for breakdown)
    - Team Member Delegations and Timeline Report (5%), Progress Report (5%), Design Report (20%), Design Presentation (10%)

GRADING SCALE:

- **A:** 90% - 100% (Any percentage above 100% will still be considered an A grade)
- **B:** 80% < 90%
- **C:** 70% < 80%
- **D:** 60% < 70%
- **F:** < 60%

Description of Graded Components

Below are summaries for each grading component from above (1-4):

1. **Attendance and Participation:** Please see the "Attendance and/or Participation" section below for details.
2. **Exam 1:** This is a midterm exam of 5 questions with several subparts. The is a written exam that is administered during regular class time.
3. **Homework:** You will do 9 homework assignments, where your lowest score is removed for grading purposes.
4. **Group Project:** You will be assigned to a group and perform several tasks (i.e., Team Member Delegations and Timeline Report, Progress Report, Design Report, and Design Presentation) for your final project. Your final project will challenge your group to design a smart and sustainable neighborhood from scratch (i.e., you'll design on an 'empty' plot of land).

USG Required Course Policies

Attendance and/or Participation

This course experience will be enriched by your frequent attendance and engaged participation. This is especially true since such a large percentage of your grade is reliant upon the Group Project and your connection with other classmates. Given this, the Instructor will monitor class attendance through the quizzes administered at the beginning of class. A percentage point will be deducted for every two consecutive classes missed without an excused absence (i.e., excused absences follow the Student Absence from Class Due to Illness or Personal Emergencies policy); up to 5% loss for that individual.

Disruptive or disrespectful behavior will not be tolerated. It often distracts your classmates from learning and engaging comfortably. The expectations are that you will:

- Conduct yourself as an engineering professional.
- Come to class ready to participate and learn. Cellular phones or other mobile devices must be silenced and out of sight. Laptops and the like are permitted if they are used for class activities and are not disruptive.
- Bring your curiosity with you to class and ask questions freely. If I don't know the answer, I'll try to find out.
- Submit work that is neat, complete, and easy to follow. This is good practice as you progress as a professional.

Violation of these standards that follow the first written warning from the Instructor will result in a percentage point deduction for each incident thereafter; up to 5% loss for that individual.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

Below are the primary career-ready competencies that you will develop during this course:

- Critical Thinking: Making decisions and solving problems through the use of logic and reasoning to identify the strengths and weaknesses of alternative solutions, and draw conclusions, or approaches to challenges.
- Teamwork: Build and maintain collaborative relationships to work effectively toward common goals, while appreciating diverse viewpoints and shared responsibilities.
- Perspective-Taking: Considering perspectives other than one's own and allowing new information, differing opinions, and others' experiences to impress upon one's thinking, understanding, and appreciation of others.
- Problem-Solving: Problem solving is the process of designing, evaluating, and implementing a strategy to solve problems using data, knowledge and facts.
- Information Literacy: The ability to recognize when information is needed and how to locate, evaluate, effectively use, and synthesize the needed information, and appropriately credit original material.
- Time Management: Behaviors that aim at achieving an effective use of time while performing certain goal-directed activities and the ability to prioritize and structure tasks, resources, and time.

Additional Georgia Tech Required Policies

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the

environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

PREREQUISITES:

Undergraduate Students: CEE 3000/2090 (Civil Engineering Systems) or consent from your Academic Advisor.

COURSE AFFILIATIONS:

This course is a part of Georgia Tech's Center for Sustainable Communities Research and Education initiatives, which provides students with opportunities to combine their academic and career interests with their desire to make worthwhile contributions to the world and build sustainable communities where people and nature thrive in Georgia, the United States, and around the globe. More information can be found at https://scre.research.gatech.edu/.

LEADERSHIP DEVELOPMENT COURSE COMPONENT: As noted, this course is an approved elective for the *Global Engineering Leadership Minor*. As such, it incorporates a leadership development component. In this course, that component is communication – both written and oral. The leadership component is integrated into the course instruction and deliverables, so even students who are not part of the leadership minor will participate in these activities. Given this component, there will be a greater emphasis placed on written and oral communication. This mostly manifests in the Group Project item of the Grading Policy section of this syllabus.

OTHER IMPORTANT POLICIES:

GETTING HOMEWORK HELP OR THE LIKE: This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and the TA. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com.

USING ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGY: AI tech and tools are all around us and you've likely used them before whether you know it or not. It is acceptable to use AI tech to aide your course efforts (e.g., looking for Final Project research leads or data/information entry points). However, using AI tech to directly create your assignment content (e.g., Final Project written report or pertinent written assignments/homework) could be considered plagiarism, unethical, and/or may violate the Honor Code (please see "HONOR CODE" section below for more details). If you are ever confused on when its use is ethical or in potential violation, please ask the Instructor for clarity (e.g., during office hours) before completing or turning in your assignment(s).

SAFE SPACE AND DIVERSITY STATEMENT: CEE 4160 is a safe space. All persons will be respected and should feel comfortable to ask whatever questions they have. Furthermore, this classroom environment is a place where you will be treated with dignity and respect, welcoming individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member. Please feel free to schedule office hours with the Instructor if there is a concern or question you feel needs to be asked privately.

Here are some inviting actions that can help provide a comfortable environment (please see below):

- Let the Instructor know your name or pronouns if they have been mistaken.
- Let the Instructor know if something that is happening in class has made you uncomfortable, even if the Instructor is presumed to be the primary reason for your discomfort.

HONOR CODE: Academic integrity is expected of all students. Anyone suspected of cheating or plagiarizing – such as on individual homework assignments and exams - will be reported to the Office of Student Integrity, which will investigate the incident and identify the appropriate penalty for violation. It is important to note that suspicion of cheating and plagiarizing differs when group project work is developed and/or submitted. The Instructor expects shared writings and content in the context of specified group project work.

For any questions involving these matters or any other Academic Honor Code issues, please ask the Instructor during office hours. For further information on Georgia Tech's Academic Honor Code, please visit this link or this one.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: If you require special accommodation(s), please contact the Office of Disability Services at (404) 894-2563 or via this link as soon as possible. Through this, an appointment should be made to discuss your particular needs and to obtain an accommodations letter. Please email the Instructor soon after receipt to discuss.

RECORDINGS OF CLASS SESSIONS: Classes may not be recorded by students without the express consent of the Instructor unless it is pursuant to an accommodation granted by the Office of Disability Services. Class recordings, lectures, presentations, and other materials posted on Canvas are for the sole purpose of educating the students currently enrolled in this course.

Students may not record or share the materials or recordings - including screen capturing or automated bots - unless the Instructor gives explicit permission. Digitally proctored exams may require students to engage the video camera, but those recordings will not be shared with or disclosed to others without consent unless legally permitted.

- For classes where participation is voluntary, students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded.
- For classes requiring class participation, if students are identifiable by their names, facial images, voices, and/or comments, written consent must be obtained before sharing the recording with persons outside of who is currently enrolled in the class.

ILLNESS CONSIDERATIONS: Please refer to the Student Absence from Class Due to Illness or Personal Emergencies resource.

OFFICE HOURS: You are encouraged to use Instructor Office hours. When doing so, please keep these principles in mind: (1) Make sure you have read the assigned material(s) and attempted the work before seeking assistance from the Instructor (e.g., please use Piazza and the other Canvas resources for this); (2) Asking for help early is always better than asking later; and (3) When asking for an appointment outside of the standing in-person office hours, please speak with the Instructor in-person before or after class time, if at all possible, and email the Instructor with at least three date-time options.

PERSONAL SUPPORT RESOURCES: There are a multitude of resources available to you. You are encouraged to utilize these resources at your leisure or when you feel they are needed. A listing of some are: the Counseling Center, STAR Services, Stamps Health Services, Veterans Resource Center, and the Georgia Tech Police (call 404-894-2500).