

CEE 4005 Syllabus

Innovation & Entrepreneurship in Civil & Environmental Engineering Systems

Class Meets Thursdays 5:00pm - 7:45pm

3 credits

Fall 2026

Instructor Information

Instructor

Bill Higginbotham, P.E.

John E. Taylor, Ph.D.

Email

bhigginbotham@etenv.com

jet@gatech.edu

General Course Information

Description

This course is intended to provide students with a rich understanding of the role and opportunities for innovation and entrepreneurship in Civil and Environmental Engineering Systems. For the purpose of this course, these systems include artifacts, products, processes and organizations that are involved in or related to the design, construction, operation and maintenance of civil infrastructure. Whether the system is a new digital device, a software system or a start-up company seeking to commercialize a system, this course will seek to provide students with the necessary knowledge and skills to successfully deploy their system. The course instruction and assignments will seek to provide the future innovator/entrepreneur with tools and skills ranging from business formation essentials, finance and investor strategies, idea generation and market assessment, intellectual property protection, organizational performance and success, leadership and teamwork, and risk management among others.

Course Learning Outcomes

Upon successful completion of the course, students will be able to:

- Describe business formation and models;
- Generate creative ideas through a team ideations process;
- Perform necessary steps in establishing a business, including market analyses, a business plan, and engage in customer discovery;
- Demonstrate knowledge of business law and ethics;
- Understand industrial dynamics and external forces that impact entrepreneurial endeavors;
- Explain the attributes that drive customer behavior;
- Exhibit leadership and team-building skills;
- Identify and execute strategies to manage risk to an organization/system.

Required Course Materials

Course Text

There is no required textbook for the course. Instead, students will be given reading assignments from reports/papers readily downloadable.

Additional Materials/Resources

Difficult to access but relevant materials will be posted on the course Canvas website.

Grading Policy:

Student assessment in the course will be based on the following elements:

Grading Components	Points
Assignments (total of 50 points)	
Individual Profile	4 points
Team Ideation	4 points
Organizational Chart/Roles	4 points
Company Profile	4 points
Team Mission/Vision/Values	4 points
Venture Positioning	4 points
Financial Projections	4 points
Market Analysis	4 points
Branding	4 points
Customer Discovery 1 & 2	6 points
Individual Reflection	4 points
C-suite Day	4 points
Midterm Pitch (Draft Business Plan)	15 points
Final Pitch (Business Plan Pivots & Risk Response)	15 points
Final Report (Final Business Plan)	20 points
TOTAL	100 points

Description of Graded Components

Assessment of student performance during the course will be based on several elements and deliverables. The relative importance of these elements is summarized above. While independent from each other, the various assignments and performance measures build on each other. Thus, students should recognize the importance of sustained effort throughout the course. The final consideration in the grade will be based on an assessment of each individual's performance as a team member by their fellow team members. This latter element is intended to ensure all team members participate actively in all group activities.

Your final grade will be assigned as a letter grade according to the following scale:

- A 90-100%
- B 80-89%
- C 70-79%

- D 60-69%
- F 0-59%

At Georgia Tech, grades are awarded on a scale of A-F with no +/- grades permitted. Much of the effort in this course is based on group work. According to policy, grades at Georgia Tech are interpreted as follows:

- A Excellent (4 quality points per credit hour)
- B Good (3 quality points per credit hour)
- C Satisfactory (2 quality points per credit hour)
- D Passing (1 quality point per credit hour)
- F Failure (0 quality points per credit hour)

See <http://registrar.gatech.edu/info/grading-system> for more information about the grading system at Georgia Tech.

The class will consist of various assessments: in-class exercises, assignments, a midterm presentation, a final presentation, a final report, and an individual reflection. As students in this course, your team will need to identify an opportunity, create a company concept that delivers a product or service to the engineering industry, and perform an entrepreneurial pitch. The in-class exercises and some of the assignments are designed for you to ideate as a team, conduct analyses on your innovation, create a company concept, and ultimately produce elements of your final business plan.

C-suite Day

C-suite Days are intended to assess individual contributions to the team, as well as prepare students for a real-world inevitability: being called upon to provide impromptu updates of your team's project. Earlier in the semester, teams will assign C-suite roles to its individual members. The more common C-suite roles include: Chief Executive Officer (CEO), Chief Financial Officer (CFO), Chief Information Officer, Chief Marketing Officer (CMO), Chief Operations Officer (COO), and Chief Technical Officer (CTO). The roles you choose will be based on the number of team members and key requirements of the venture. On C-suite Days, your C-suite executives will be called upon to provide a short update on your team's progress (specifically as it relates to that individual's role) and field questions.

Midterm Business Plan Pitch

The Midterm Business Plan Pitch is an extended elevator pitch of your startup concept to ensure you are on the right track and to obtain feedback.

Business Plan Pivots and Risk Response Pitch

The final Business Plan Pivots and Risk Response Pitch should reflect changes based on feedback from the Midterm Business Plan Pitch, how your Business Plan is Pivoting as a result of the risk scenario, as well a detailed explanation of your response to the Risk Response Assignment.

Final Business Plan Report

The Final Business Plan Report is a 6-page maximum length written summary. It should include a 1-page executive summary and a 5-page business plan. Additional requirements for the report will be discussed in class.

USG Required Course Policies

Attendance and/or Participation

While attendance and/or participation is not formally required in the course, students will be strongly encouraged to participate in all facets of the course.

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.

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.

Pre- &/or Co-Requisites

There are no formal course pre-requisites for this course, however, students who have prior curricular and co-curricular activities in system ideation, business operation and team oriented exercises will have the opportunity to advance their experiences. Only students with Junior/Senior standing are permitted in the course.

Collaboration, Group Work, and Use of Generative AI

Given the importance of collaboration and teamwork in initiating and growing an engineering system (product or company), this course is predominantly based on group activities and effort. A portion of the overall course grade is based on assessment by fellow team members of each individual's effort and contribution, thus students should keep this obligation to their fellow team members in mind.

Campus Resources for Students

Students are encouraged to familiarize themselves with any resources that might help them succeed in the class (e.g., the library, The Communication Center, or The Center for Academic Success). The instructors also enthusiastically support students reaching out to resources that support mental and emotional wellbeing (e.g., The Counseling Center, The Division of Student Life, or Women's Resource Center). [Click here](#) for a list of relevant campus resources available to Georgia Tech students.

Course Schedule

MODULE	CLASS	PART A	PART B
Fundamentals	1	1A. Course Introduction	1B. Industry Pathways
	2	2. Create X Demo Day	
	3	3A. Ideation & Innovation + Student Intros	3B. Customer Problem Discovery Workshop
	4	4A. Entrepreneurial Pathways + Business Formation	4B. Teaming Workshop (Guest)
	5	5A. Team Formation, Leadership, and Ideation Workshop	5B. Mission, Vision, Values
Developing	6	6A. Strategy & Venture Positioning	6B. Market Analysis & Sizing
	7	7A. Finance - Sources and Uses	7B. Basics of Risk Management
	8	8A. Entrepreneur (Guest)	8B. Customer Solution Discovery Workshop
Refining	9	9A. Elements of a Business Plan and a Venture Pitch	9B. Team Workshop and C-Suite Scramble
	10	10A. Branding (Guest)	10B. PE Licensure, Conflict, Ethics, & Law
	11	11. Midterm Business Plan Pitches	
Testing	12	12A. Navigating Risk + Risk Scenarios Assigned	12B. Team Risk Workshop and C-Suite Scramble
	13	13A. Entrepreneurial Impact Competition Workshop (Guest)	13B. Venture Finance (Guest)
	14	14A. Business Plan Pivots + Risk Responses	14B. Course Summary