

SYLLABUS

Technology Applications in the Construction Industry (BC 6005), three credit hours

Location: College of Computing 52

Tuesdays, 5:00 pm - 7:45 pm

Instructor's Information

Instructor

Dr. Omobolanle (Bola) Ogunseiju

Email

omobolanle@gatech.edu

Office Hours & Location

Room 233 Caddell building,
Fridays 1-2 pm, also available via appointment.

General Information

Description

Timely information about the status of materials, equipment, tools, and labor is critical for the successful completion of construction projects. Construction technologies are important for tracking, locating, and monitoring these resources on construction sites. This course is designed to provide you with an understanding of the concepts, approaches, and implementation issues associated with deploying several technologies in the construction industry. You will be equipped with the knowledge of extracting timely information about the status of materials, equipment, tools, and labor, which is critical for the successful completion of construction projects.

Course Goals and Student Learning Outcomes

Upon completion of this course, you will be able to:

1. **Apply** electronic-based technology to manage the construction process;
2. **Determine** the data requirements for the tracking, monitoring, and controlling needs of construction activities;
3. **Understand** construction risk management;
4. **Evaluate** the suitability of different construction technologies for monitoring the progress and performance of construction projects;
5. **Extract and analyze** data from construction technologies, and represent the results in formats suitable for decision-making.

Course Requirements & Grading Structure

Course Grading:	Assignments	Weight
	Participation/ Attendance	15%
	Homeworks	55%
	Semester Project	30%

Description of Graded Components

Participation activities will be administered at the instructor's discretion to evaluate your understanding of the learning content. The homework test will provide hands-on learning of the technology or topics discussed in class, and the semester project is a platform to create scenarios of the application of technologies for solving issues in the construction industry. This course consists of attendance and participation (15%), individual and group practices (55%), and a semester project (30%). Below is a table showing the percentage distribution and a brief description of each evaluated item.

Classes		15%
Attendance and participation	15%	Attendance at the sessions and visits, and participation during class discussions.
Practice assignments		55%
Laser Scanning	10%	Individual practice assignments on the main technologies introduced during the class, so that you can get familiar with the use and processes on your own.
Ergonomic risks assessment	15%	
Automation in construction	10%	
Virtual Environments	20%	
Semester Project	30%	30%
		Semester project to evaluate your understanding of the concepts and technologies covered in class

Attendance and In-class participation (15%)

This considers your attendance at the class sessions, in-class exercises, and site visit. It also accounts for your active participation during the lessons and discussions. The idea of the in-class exercises is to give you an opportunity to practice the concepts and processes discussed during the instruction sessions, with supervision and guidance from me. During these activities, we will work on small examples and exercises that will help you better understand the technologies covered and prepare to apply them in the individual practice assignments, quizzes, and further professional career. During these practice activities, you will have to submit your work during class in the time and space provided, which will be either in person or in Canvas.

Practice assignments (55%)

There are four practice assignments throughout the class. The assignments will include theoretical questions and practical problems for you to practice the concepts and processes on your own and demonstrate your ability and understanding of them. Beyond merely providing a grade, the goal of these assignments is for you to challenge yourself by truly learning and mastering the concepts so that you can apply them in future classes and your professional career. Practice assignments are due by midnight on the week indicated in the course schedule. You will upload your assignment to the space provided for it in Canvas.

Semester project (30%)

The semester project is a group work where you will apply construction technology to address real-world risks. You will be tasked to select a construction site, observe key activities, identify a specific risk, and simulate the implementation of a technology to mitigate that risk. The project will be evaluated based on your project report (a conference paper), your presentation and a project check-in. Your findings will be documented in a final report written in the format of a **conference paper**.

1. Project check-in **10 points**
2. Project presentation – **20 points**
3. Final project report / paper – **70 points**

Grading Scale

Grades may be curved at the discretion of the instructor to provide a balance of intellectual challenge and academic reward. 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%

Course Materials

This course is structured as lectures with discussions, lab/field demonstrations, assignments, and a semester project. Other resources will be provided in class.

Course Text

No textbook is required for this class. Reading materials will be provided by the instructor when it is necessary.

Computer needs: Some of what we will be doing is computationally intensive. You will need to install software, some of which will require powerful graphics/video cards. You are also advised to get a Windows operating computer for easy access to all software used in class.

Programs and software:

Software will be used to process data from the sensors. Due to the memory requirements of the software, download links will be provided before the lectures. Here is a list of the software we will use in class.

For your computers

Matlab: [Georgia Institute of Technology - MATLAB Access for Everyone - MATLAB & Simulink \(mathworks.com\)](#)

Faro Scene: [FARO® SCENE 3D Point Cloud Software | FARO](#)

For your phones

Sensor play: [Sensor Play - Accelerometer and Gyroscope data recorder. - Free download and software reviews - CNET Download](#)

Physics toolbox suite: [Physics Toolbox Sensor Suite - Apps on Google Play](#)

Course Expectations & Guidelines

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. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating or plagiarizing 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.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible to make an

appointment to discuss your special needs and to obtain an accommodations letter. Please also email me as soon as possible to set up a time to discuss your learning needs.

Respectfulness and Communication: It is important that we maintain a very respectful space for teaching and learning. I appreciate when you contribute in class, but let's do this respectfully. Please communicate with me professionally. You can call me Dr Ogunseiju, Dr. O, Professor, but not Hey!, Hi, Hello. Please don't send me emails outside office hours and on weekends. If you do, please expect a response during regular office hours.

Laptop/Handheld Computer Use

Laptop/handheld computers may be used in class to take notes ONLY, but not for other purposes, such as e-mail, Web site searches, chat, or other personal uses. Students using computers during class for work not related to that class must leave the classroom for the remainder of the class period. Abuse of this policy will result in the prohibition of laptop use by this student.

Lecture notes will be posted online. The use of computers for social media sites and 'other classes' assignments is highly prohibited.

Use of Mobile Devices in the Classroom

All communication devices must be turned off in the classroom. The use of cell phones, beepers, or other communication devices is disruptive and is therefore prohibited during class. No personal listening devices or personal transportation devices are permitted.

Make-up Exams

There will be no make-up exams under any circumstances, except for medical reasons. Provide me with a letter from your medical doctor to schedule a make-up exam. No makeup will be given for a test missed without prior approval and for a comprehensive final examination.

Attendance

Regular and punctual attendance is expected in all sessions. Please, if you are late to class, always use the back door to avoid distracting your colleagues and the instructor.

Homework and Quizzes

Homework is due at the beginning of the class or on the due date indicated. Late homework will not be accepted. Announced or Unannounced quizzes will be given as needed.

Food and Drink in the Classroom

You are not allowed to bring food or drinks into the classroom unless approved by me.

Class Discussions

Your active and productive participation in class discussions is encouraged. Various viewpoints and opinions are encouraged and welcome. Questioning the ideas of others, including mine, is similarly welcome. However, I will exercise my responsibility to manage the discussions so that ideas and arguments can proceed in an orderly fashion. If your conduct during class discussions seriously disrupts the atmosphere of mutual respect, you will not be permitted to participate further.

Plagiarism

You are expected to do your work in this course. To use another writer's or speaker's ideas without giving proper credit through standard documentation is plagiarism. All course papers, notes, homework, and projects submitted to the instructor are subject to textual similarity review for the detection of plagiarism. All submitted papers will be included as source documents in the reference database to detect plagiarism of such papers. I will follow the Institute's policy for plagiarism.

Policy Changes

Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. Work with me to create a positive, respectful, and engaged academic environment inside and outside of the classroom. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of 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.

Campus Resources for Students

There are several resources available to you that might help you succeed in class (e.g., the library, The Communication Center, or The Center for Academic Success. students' mental and emotional well-being support (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 you.

How can I succeed in this Class?

This is a fun class where you get exposed to major technologies for surveying and visual data capture in the construction industry. To succeed in this class, it is important to participate in class activities. I will work with you on the majority of the assignments and have them completed in class. This means that when you come to class, you will be able to complete most of your assignments successfully. You will also be better equipped to implement technologies on construction sites, which will help you complete your semester project successfully.

Course Schedule

The Course Instructor reserves the right to modify the course schedule to better serve the needs of students. Assignments and their due dates will be provided as material is covered to allow for maximum flexibility.

Wks	Dates	Topics	Notes
1	08/19	Administrative Matters, Introductions, and Course Overview	Intro
2	08/26	Wearable sensors in the construction industry. Introduction to different sensors: <i>Sensors – EMG, IMU, EEG</i>	
3	09/02	Laser scanning – theory and <i>planning</i>	Q2
4	09/09	Laser scanning collection	
5	09/16	Stitching scans for BIM	A1 due
6	09/23	Applications of virtual environments in the construction industry: <i>VR for as-built Inspections, MR for sensing technologies – Hands-on activity</i>	
7	09/30	Virtual environments in construction/ Support sessions for As-built modelling	
9	10/07	Fall break	
8	10/14	Ergonomic risks in construction/ Ergonomic Risk Assessment with sensors - kinematics	
10	10/21	Robotics in Construction: Types and Functions of Exoskeletons, Usability, Performance, and Physical Demands. Wearable robots (Exoskeletons) in construction. <i>Robotics layout demo</i>	A2 due Layout robot -
11	10/28	<i>Wearable robots: Exoskeletons demo – Hands-on activity</i>	
12	11/04	Digital construction: Bluebeam Automation in construction: Recognizing construction workers' risks using machine learning algorithms – AI and Big Data	A3 due
	11/11	Automation in construction: Recognizing construction workers' risks using machine learning algorithms – AI and Big Data <i>Semester project Intro</i>	
13	11/18	Trip to 3D Printing Lab 3D printing in Construction <i>Guest speaker</i>	ICON A4 due
14	11/25	Drones and Laser scanning in construction – Hands-on activity <i>Guest speaker</i>	B&G
15	12/02	AI in Construction: <i>Guest speaker project check-in</i>	Doc Crunch
16	12/09	Project Presentations	Project due