

MSE 1111: Introduction to Materials Science and Engineering (1-3-1)

Fall 2025, Tuesday and Thursday, 2:00-3:15 pm, MRDC 2407

Instructor Information

Instructors	Email	Office Hours & Location
Naresh Thadhani	naresh.thadhani@mse.gatech.edu	By appointment, Love 154
Alena Alamgir	alena.alamgir@mse.gatech.edu	By Appointment, Love 255
TAs	Email	
Arturo Medina	amedina43@gatech.edu	
Yiming Zhang	yzhang3485@gatech.edu	

Course Description – The What?

This course will provide a general introduction of the field of Materials Science and Engineering (MSE) through guest lectures in the context of the MSE curriculum and based on the process-structure-property-performance paradigm. The course aligns with Georgia Tech's **Sustainability Next** program "**Designing and Nurturing a Sustainable World of Materials: Integration of United Nations Global Sustainable Development Goals (SDGs)**" and will explore the role of materials in advancing sustainability. The SDGs include 17 interlinked objectives that serve as a "shared blueprint for peace and prosperity for people and the planet, now and into the future."

Pre- &/or Co-Requisites: No pre-requisites or background knowledge required.

Course Goals and Learning Outcomes – The Why?

This course is designed so that, upon successful completion, you will be able to:

1. Describe basic types of materials and explain their significance in everyday use;
2. Communicate about materials science and engineering topics in a way that makes technical aspects accessible to the general public, and
3. Work in teams on projects demonstrating how aspects of process-structure-property-performance paradigm aid the design, development, and applications of materials.

Brief List of Topics Covered

Fundamental presented by Faculty Instructors:

Metals, Polymers, Ceramics, Composites, Cellulosic Materials, Concrete, Materials for Batteries, Bioinspired/Intelligent Materials, and Materials for Solar Cells, United Nations SDGs, Materials Design, Computational Materials Science, Materials Selection using Granta Edupack, Writing Technical Papers and Reports, and Effective Presentations Principles & Applications

Applicational topics presented by Guest Lecturers from Industry:

Southwire Industries Electrical Cables, Polymers at Kimberley-Clark, Ceramic Honeycombs at Applied Ceramics, Inc., Aluminum for Cans and Automotive at Novelis, Steelmaking at Gerdau, Biomedical Devices.

Course Materials

Course Text: *Stuff Matters: Exploring the Marvelous Materials that Shape our Man-Made World*, by Mark Miodownik, Houghton Mifflin Harcourt Publishing Company, New York, NY 2015.

Additional Materials/Resources

NOVA Making Stuff video series: <http://www.pbs.org/wgbh/nova/tech/making-stuff.html>

Course Requirements & Grading

The course grade will be based on the following assignments (percentages indicate weight):

Assignment	Due Dates	Weight
Attendance	Tuesdays and Thursdays	10%
Four Short-Response Papers	Due Dates: Sep 4; Sep 16; Sep 25; Oct 16	30%
“Make” & “Measure” Mini-Lab Reports	“Make” Lab due on Oct 9 “Measure” Lab due on Nov 6	30%
Materials Design Team Project: Written Statement	Due on Oct 23	10%
Materials Design Team Project: Draft Slides	Due on Nov 13	5%
Materials Design Team Project: Final Presentations	Group I - Nov 20 and Group II - Nov 25 Everyone MUST Attend Both Sessions	15%

- **Class Attendance:** Students are expected to attend all scheduled classes and events, including **MILL Tour** (Sep 4), **Poster Showcase** and **3-Minute Research Challenge** presentation contest (Oct 30), and Group Presentation days (Nov 20, 25). Daily attendance will be taken during class and for each outside-the-class activity. Absence will only be excused due to Institute sanctioned activity or documented illnesses (see <http://catalog.gatech.edu/rules/4/>).
- **Four writing assignments (Short Response Papers)**, based on readings from the *Stuff Matters* book and/or lectures, will be given with at least a week for completion. These will be used to assess your understanding of readings and presentations and provide practice in technical communication. **LLM-based AI** is not permitted for generating the content of the texts, but may be used as an advanced spell checker.
- Two separate **“Make” and “Measure” mini-lab reports** based on independent work you complete on your own (not as part of team), using equipment in the MILL, Flowers invention studio, or any other maker/lab space on campus. The **lab reports** will be individual efforts in the form of a one-page narrative describing or showing (a) material(s) used, (b) method employed to “make” the material or to “measure” its properties or structure, (c) picture of object produced (for “Make” something lab), the data generated (for “Measure” something lab), or the equipment used for making/measuring, and (d) brief statement about what you learned from the experiment. LLM-based AI is not permitted for generating the content of the texts, but may be used as an advanced spell checker.

- **Materials Design Team Project** formulated and completed by *students working in teams*. The overall project theme will be based on **the role of materials in meeting the UN Sustainability Development Goals**. The specific project topic will be at the discretion of the student team, subject to instructor approval. Assessment of the design project will be based on (a) written project statement (due on Oct 23), (b) draft presentation slides (due on Nov 13), and (c) final team presentations (Nov 20 for Group I or Nov 25 for Group II), following revisions based on instructor feedback provided to teams by Nov 17. Detailed instructions on content/style for effective presentations will be provided in class.
- **Detailed instructions and formatting guideline for each assignment will be provided.**
- **Grading Scale:** Your final letter grade will be assigned according to the following scale:
A (90-100%); B (80-89%); C (70-79%); D (60-69%); F (0-59%)

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. See information on GT Academic Honor Code: <http://www.catalog.gatech.edu/policies/honor-code/>. A student suspected of cheating or plagiarizing on any assignment will be reported to the Office of Student Integrity. Unauthorized/undisclosed use of **LLM-based AI** will be treated as cheating.

Accommodations for Individuals with Disabilities: If you are a student with learning needs that requires special accommodation, contact the Office of Disability Services at <http://disabilityservices.gatech.edu/>, or (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 the instructors to set up a time to discuss your learning needs and accommodations.

Collaboration & Group Work: *Writing assignments including concept papers and lab reports are individual work*, unless otherwise specified. Students should not collaborate on these assignments. The *materials design project is a team assignment*, and will require preparation of the slides and final presentation by the entire team. Collaboration is required for this assignment, and each member is expected to contribute equally.

Student Use of Mobile Devices: Please silence all mobile devices at the beginning of class. **Laptops are allowed only for taking notes and not for any other work.**

Student-Faculty Expectations: At Georgia Tech we believe that it is important to continually strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty and students. See <http://www.catalog.gatech.edu/rules/22/> for basic expectations that you can have of instructor, and that they have of you. Simple respect for knowledge, hard work, and cordial interactions, will help build the environment we seek. **We encourage you to be committed to these ideals at Tech, while learning from and enjoying the lectures presented and activities offered in this class without being too overwhelmed or stressed.**