



MSE 4022: Material Processing Lab-II

SYLLABUS

FALL 2026



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Writing & Communication
Instructor: Dr. Alena Alamgir

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1. Course Description

Welcome to MSE 4022! This materials processing laboratory course is designed to provide you with an opportunity to learn various material processing techniques and correlate the processing parameters to material properties and their performances. The experiments in this course will highlight the influence of process variables on the evolving microstructure and resulting properties, while also helping you develop safe and effective laboratory practices and report writing skills. The course is divided into three modules, each focusing on the processing of ceramics, metals, and polymers respectively. Emphasis will be placed on hands-on participation, information gathering, data analysis, technical-report writing, and following safe, reliable, and responsible laboratory procedures.

2. Student Learning Outcomes

Upon successful completion of this course, students would be able to:

1. Demonstrate following **practical skills**
 - a. Process materials such as ceramic slurries, molten metal, and polymer blends into useable products
 - b. Develop experimental design and data analysis skills
 - c. Identify and describe manufacturing-related factors that can affect the environment and economy of a nation
 - Economical and sustainably-conscious materials selection and processing methods
 - Energy consumption; Waste generation and management
2. Exhibit **enhanced cognitive abilities**
 - a. Identify various fundamental principles that drive material processing and recognize practical challenges during processing
 - b. Recognize the role of process parameters in determining the material microstructure and thus the material properties and product characteristics
 - c. Discuss relevant strategies and practices of sustainable materials manufacturing and consumption
3. Be **effective communicators** by
 - a. Producing professional quality documents as written reports
 - b. Demonstrating effective interpersonal communication skills in a team setting

3. Tips for Success

- **Ask questions.** Use any mode you like to communicate your questions/concerns, via e-mail, during student hours, lectures, in the lab, or on Discussion Board. I know that it can be confusing with several moving parts to this course, so I'm always happy to clarify and provide assistance.
- **Make connections.** You are in a class with many wonderful people. They are working hard to learn the same content as you. Be willing to ask a peer for direction or be that student that helps another.
- **Think through experiments.** Evaluate why each step is included. Discuss with your group members the relevance of each step. This will help you relate processing variable with the characterized property.

4. Course Logistics

4.1 Lecture Schedule

Lecture: Friday, 9:30 – 10:20 AM

Location: IC # 105

Week #	Date	Class Topic	Instructor	Deliverables/ Notes
	August			
1	28 th	<ul style="list-style-type: none"> Course Overview Technical Writing 	Dr. Sharma/ Dr. A. Alamgir	
	September			
2	4 th	Ceramics Lecture #1 (Slip Casting & Rheology)	Dr. Sharma	
3	11 th	Ceramics Lecture # 2 (Mechanical testing & Stat. analysis)	Dr. Sharma	
4	18 th	Writing Lecture- 1	Dr. A. Alamgir	
5	25 th	Discussion – Lab Report Writing	Dr. Sharma	Ceramics Report Due (Mon 9/25)
	October			
6	2 nd	Metal Lecture #1: Steel Rolling, Structure, and Properties	Dr. Sharma	
7	9 th	Metal Lecture #2: Aluminum Casting, Microstructure and Properties	Dr. Sharma	
8	16 th	Novelis Guest Lecture	Dr. DaeHoon Kang	
9	23 th	Writing Lecture- 2	Dr. A. Alamgir	
10	30 th	Discussion – Lab Report Writing		Metals Report Due (Mon 10/30)
	November			
11	6 th	Polymer Lecture #1: Compounding polymers	Dr. Sharma	
12	13 th	Polymer Lecture #2: Compression Molding + Microstructure of blends	Dr. Sharma	
13	20 th	Polymer Lecture #3: Discussion	Dr. Sharma	
14	27 th	Thanksgiving Holiday		
	December			
15	4 th	Wrap- Up Discussion	Dr. Sharma	Presentations

4.2 Laboratory Schedule

Laboratory Sections:

Section A01: Tuesday 8:00-10:45 AM

Section A02: Tuesday 3:30-6:15 PM

Section A03: Wednesday 8:00-10:45 AM

Date	Class Topic	Location
August		
T, W 19, 20	NO LABS	
September		
T, W 1, 2	Ceramics Lab 1: PoP mold fabrication & viscosity measurements	BH # 357
T, W 8, 9	Ceramics Lab 2: Slip Casting	BH # 357
T, W 15, 16	Ceramics Lab 3: Density and Strength measurements	BH # 357 BH # 153
T, W 22, 23	Ceramics Studio Session- Data Analysis & Writing	TBD
T, W 29, 30	Metals Lab 1: Rolling and Casting	DMS -019; IC 105; MRDC 2405
October		
T, W 6, 7	FALL BREAK ON TUES NO LAB ON WED	
T, W 13, 14	Metals Lab 2: Polishing & hardness test	Love # 157
T, W 20, 21	Metals Lab 3: Metallography	Love # 157
T, W 27, 28	Metals Studio session: Data Analysis/ SDG Discussion	DMS -019; IC 105; MRDC 2405
November		
T, W 3, 4	Polymer Lab 1: Polymer compounding	BH 341/ 348
T, W 10, 11	Polymer Lab- 2: Extrusion & Punching	MILL- Love 167
T, W 17, 18	Polymer Lab- 3: Characterization & Testing	BH 341/ MILL- Love 167
T, W 24, 25	THANKSGIVING HOLIDAY	
December		
T, W 1, 2	Polymers Studio session: Data Analysis/ SDG Discussion	DMS -019; IC 105; MRDC 2405
Fri (4 th) Tues 8 th	Presentations on Fri/Tues	IC 105 and TBD

4.3 Instructional Team

Technical Instructor:

Dr. Himani Sharma, MRDC #4504 / himani.sharma@mse.gatech.edu

Writing Instructor:

Dr. Alena Alamgir, Love 255, 404-385-3979/ aalamgir7@gatech.edu

Teaching Assistants (TA)

The TAs listed below, will be supervising lab sessions and will be available to provide additional assistance. Their contact information is given in Table-1. TAs will hold office hours in weeks when a major assignment is due. Details of their office hours will be posted at the start of new lab module.

Table-1: Technical and Writing Teaching Assistants in the course

	Ceramics	Metals	Polymers
TA-1	TBD	Jackson Smith jsmith994@gatech.edu	Ide Onal ional6@gatech.edu
TA-2		TBD	Volha Heben vheben3@gatech.edu
TA-3			
	Writing TAs		
	TBD	TBD	

5. General Course Policies

5.1 Canvas

The Canvas site will be maintained for the course and should be checked frequently for updates. Students are required to go through updates on Canvas homepage during the first week of semester and complete the required online lab safety trainings to gain lab access the following week.

5.2 Required materials

- Lab Notebook ([\\$15 option on Amazon](#) is acceptable)

5.3 Originality and Academic Integrity: Your Commitment Matters

A cornerstone of academic excellence is upholding originality and integrity in your work. This principle extends to refraining from any form of plagiarism, which includes, but is not limited to:

- Copying from Previous Reports
- Copying Peer's Work
- Paraphrasing Without Attribution: Even if you rephrase a text in your own words, if the ideas are not yours, proper citation is essential.
- Direct AI-Generated Text: While AI-generated text can be a useful resource, avoid using it verbatim. If you choose to incorporate AI-generated content, always explicitly state the source, including the reference to the tool used for generation. Ensure that your writing reflects your comprehension and style.

- **Replicating Visual Content:** This includes images, graphs, and diagrams. If not created by you, provide proper credit.

In summary, students in this class are expected to write up their assignments and laboratory reports individually. Group members may work on the data analysis in clusters, but then each student must write up the results/discussion separately. To ensure transparency and accountability, each student is required to generate a similarity report via Turnitin in Canvas. This report will be automatically shared with the instructors. Note that the lab manuals and handouts serve as valuable references, but they are not intended for verbatim replication in your work.

Let's collectively uphold the standards of authenticity and intellectual honesty in strict compliance with Georgia Tech's [Academic Honor Code](#), fostering an environment of genuine learning and growth. Your unique perspectives and efforts contribute to the rich fabric of our academic community. In an unfortunate scenario of work containing evidence of academic misconduct is caught, it will be formally reported to the Office of the Dean of Students to initiate a formal investigation.

5.4 Respect for Diversity

As an instructor, it is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. I broadly define diversity to include gender, age, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. *"I strive to make this classroom an inclusive space for all and would welcome and appreciate suggestions you may have to ways I can improve. In addition, if any of our class or lab meetings conflict with your religious events, please let me know so that we can make arrangements for you."*

5.5 Learning Accommodations

Any student that feels they may need accommodations should contact Dr. Sharma privately to discuss his/ her needs. It is also imperative that you contact the [Office of Disability Services](#) (ODS) as soon as possible at (404)-894-2563 to ensure appropriate accommodations are made in a timely fashion.

5.6 Attendance/ Participation

Attendance in ALL labs is required. Kindly notify a TA and Dr. Sharma ahead of time, if you anticipate missing a lab period. This will allow instructional team to arrange for a makeup session during another regularly scheduled lab session that week. It is crucial to remember that attending a lab section for which you are not officially registered requires prior permission. No exceptions will be made in this regard.

Attendance in lectures will be recorded, however students are permitted maximum of 2 absences in a semester without the need for justification. It is also strongly advised that student participates in the class and online portals both in the labs as well as the lectures.

5.7 Student Hours

Dr. Sharma will hold two office hours for the students every week. Details of which are given below;

- In-Person: Monday (10:00 AM – 11:00 AM); Location- MRDC# 4504
- Virtual: Thursday (11:00 AM -12:30 PM);
 - [Teams Meeting](#)

If these times don't align with your schedule, I encourage you to reach out and set up an appointment at a time that suits you. You can connect via email, and arrangements for a mutually convenient time can be made. Additionally, your Teaching Assistants (TAs) will also be available to support you. They will schedule office hours at least once during each module, and you will receive the details as the dates draw nearer.

6. Assessments

All assignments will be submitted online through Canvas. Printed copies of the assignments are NOT required for submission. There will be a lab-report due at the end of first and second lab module. Key deliverable for the third lab module will be a group presentation. Weekly pre- or post-lab assignments are also required. Details of each assignment are provided in the sections below;

6.1 Weekly Assignments

These are short exercises to prepare you for the lab and strengthen your scientific understanding of concepts covered in the lab. The weekly assignments will also help you practice technical writing. These *low-stake assignments (complete (1pt), incomplete (0 pt))* will enforce timely completion of needed sections of your bulkier submissions. Depending on the module these assignments can be Pre-labs (due before lab period) or Post-labs (due after lab period).

6.2 Lab reports

You will be writing two full lab reports this semester, for first and second module respectively. Details regarding lab report will be found in the **lab report template** and **lab-specific report guides**. The guides will contain information on both writing and technical aspects of the report and will be further discussed by Dr. Alena Alamgir during writing lectures. Each lab report would be evaluated for **both technical accuracy (70%) and writing style (30%)**.

6.3 Group Presentation

The final assignment for the (third) Polymer processing module will be a group submission and a ~500 words written narrative summary. The summary will be an individual submission while the presentation would be team deliverable. This highly collaborative and engaging project will be carried out in groups of ~4 students and will be graded on technical content and oral presentation. Details and guidelines for the project will be uploaded on Canvas, before the start of polymer lab.

6.4 Lab Notebook

Logbooks (or lab notebooks) are used to record all details pertaining to the lab such as equipment identification and description, accuracy of measurements, procedures used, specimen identification, calculations, observations, personal comments and any other information required to ensure repeatable lab work. All entries must be signed and dated. Lab notebooks can be spiral or glue-bound. Bring your lab notebook to each lab segment and be current in maintaining entries. You will **turn in the relevant pages** for all three segments (Ceramics, Metals, and Polymers) **with each lab report/slides**

submitted. Each lab notebook submission will be marked as complete or incomplete, earning either 1 or 0 points.

7. Grading Criteria

7.1 Grade Distribution

The overall course letter grade is derived from the proportional contributions of weekly assignments, attendance, lab reports, poster presentation, and extra credit opportunities. Criteria to determine the final grade in this course will be calculated using the distribution shown in Table-2. The course grades will NOT be curved and final letter grade will be determined by the numerical grade boundaries (shown in Table-2).

Table-2: Grade contribution

Deliverables	Frequency/ semester	Relative weight	Grade Distribution	
Weekly	~ 6-8	15	A	90% +
Lab report	2	50	B	80 - 89.8%
Attendance	Labs + Lectures	5	C	70 - 79.8%
Group Presentation	1	25	D	60 - 69.8%
Lab Notebook	3 (one at the end of each module)	5	F	Below 60%
CIOS extra credit	If the response rate for the end of term survey exceeds 85%, bonus points would be added to the group presentation for the entire class.			

7.2 Late Submission Policy

Weekly assignments must be submitted by the designated due date. Late weekly assignments submissions will not be accepted. Lab reports* submitted after the designated deadline will incur a penalty of -10% for each day they are overdue, up to a maximum of three days beyond the original deadline. After this three-day period, no further lab reports will be accepted. Please plan your work accordingly and adhere to the provided deadlines.

*It's important to emphasize that lab reports will only be accepted if the student has attended ALL the corresponding lab sessions within the module. Failure to attend the associated lab section will result in the lab report NOT being accepted.

8. Lab Safety Protocols

Lab safety should always be the first consideration when working in the laboratory. A brief discussion of key safety points is covered in this appendix. In addition, the commonsense approach to safety should always be applied as well as a consideration for others while working in the laboratory.

All students who work in an MSE lab are required to take this seminar once every year and successfully complete an online safety examination. Lab safety trainings can be found here under "[Lab Safety 101 tutorial course](#)". If you have not taken the training in the last 12 months, you are required to take it and upload a valid certificate on Canvas (details under Getting Started Module on Canvas). The privilege to work in MSE laboratories will be revoked if your conduct/behavior in the lab exposes yourself or others to significant risk of injury. For further information on laboratory safety, contact the

MSE lab manager and safety coordinator, Dr. Masood Ebrahimi (Email: masood.ebrahimi@mse.gatech.edu, 173 LOVE).

Accidents and Emergencies [ON CAMPUS POLICE, FIRE, AMBULANCE: 404-894-2500]: In the case of a medical or other medical emergency, the phone number above should be called. Dialing 911 is not recommended due to the location on the GA Tech campus. Please be sure to inform the dispatcher that an ambulance, etc. is needed if desired and what kind of emergency is at hand. In the case of a fire, the proper fire extinguisher should be employed and the doors should be closed in conjunction with the disconnection of gas and electrical lines/circuits. Safety showers and the stop, drop, and roll principle should be implemented in case articles of clothing are on fire. In the case of chemical exposure to the skin, wash off chemicals with cold water followed by washing with soap and water. Removal of clothing and jewelry from the affected area may also be necessary. In case of chemical exposure to eyes, running water should be applied for 15 minutes while the eye is open paying careful attention to douse the inner eyelid as well. If available, an eye wash station should be used.

Protective Clothing: Eye protection is a vital aspect of lab safety. Students are required to provide his or her own safety glasses and to have them at all times when working in the laboratory. Safety glasses can be purchased in the GA Tech bookstore and at a variety of other stores (e.g.- hardware stores, scientific supply houses, etc.). Students that have prescription glasses are advised to provide side shields for enhanced safety from flying objects. Contact lenses should never be worn in the laboratory! Proper clothing should be worn to adequately protect exposed body parts (i.e. Shorts, skirts, and tank tops should not be worn). Gloves and aprons are recommended for handling chemicals and should be available in the lab area. Loose fitting articles such as jewelry and neckties should be avoided so as not to get caught in machinery. Solid toed shoes should be worn at all times. Sandals and open toed shoes offer little or no protection and must not be worn in the labs.

Safety glasses, close-toed non-fabric shoes, shirt and full-length pants are required at all times in the labs. You will otherwise not be permitted to participate in the lab.

Chemical Safety: Chemical exposure in this laboratory will most likely be due to acids and bases used as etchants for metallographic samples to outline the microstructure. Great care should be taken to avoid skin and eye contact with these chemicals. The FUME HOOD should always be used in conjunction with proper protective gear (i.e. gloves, eye protection, and apron) when handling these chemicals. Waste should be placed in a properly labelled container with contents, date, and T/A's name and/or class name. The MSDS (Materials Safety Data Sheet) should be consulted for questions. Ask the TA if not available.

The information provided in the above section is summarized from the Safety policy of the School of Materials Science and Engineering and should be consulted for more in depth information. See website for more details: <https://www.mse.gatech.edu/lab-safety>

9. Additional Campus Resources

GaTech offers variety of resources you can take advantage of. Check out the [GT Student Campus Resources](#) Module on Canvas page for a comprehensive list.