

ChBE/MSE 8803 Spring 2024
Product design through formulation and processing
Tues/Thurs 12:30-1:45 PM, ES&T L1118

Course Description: Students taking this class will learn and practice tools for handling the complex parameter space of formulation and process design in the context of materials processing.

Instructor: Prof. Blair Brettmann
Room 3100P, Molecular Science and Engineering
Tel: (404) 894-2535
e-mail: blair.brettmann@chbe.gatech.edu

Teaching Assistants: You are encouraged to contact your TA for questions. TA office hours TBD
Nisha Raman, nisha.raman@gatech.edu

Office Hours: My office hours are Tuesdays 2-3 PM, MoSE 3100P

Course Website: Canvas will be used to post the course syllabus, lecture notes, homework, and homework solutions. You will also submit your assignments and take quizzes via Canvas. Important announcements posted on Canvas so please enable notifications and check it regularly.

Attendance: *This course is designed as an in person course.* In person attendance is strongly encouraged for this course and required for the in-class activities and case studies. Virtual attendance options may be provided at the instructor's discretion. Recordings may be posted at the instructor's discretion. One week notice will be provided for any change in virtual/recording options.

Grades: Your grade in the course will be determined based on your performance on written quizzes, homeworks, the video presentation, the final project and in class activities/case studies. Final grades will be curved at the instructor's discretion and will not be curved to lower grades.

<u>Item</u>	<u>Percentage of Final Grade</u>
Homework	15%
Quizzes	15%
Processing presentation	15%
Final Project	45%
Case studies/Guest lecture participation	10%

Quizzes: All quizzes will be closed book. No formula sheets other than the ones provided with the quiz will be allowed. The quizzes will emphasize topics that are discussed in class and included in homework. The lowest quiz score will be dropped from your final grade calculation. The quizzes will be 15 minutes and will be taken at the start of the class on the day listed in the course schedule. Quizzes will be administered via Canvas and no paper quizzes will be provided. The instructor reserves the right to change this to in person, paper quizzes. One week notice will be provided for any change in virtual/in person requirements for quizzes.

Presentation: There will be a presentation on a material processing technology. We will do these on the class days assigned for the presentations. You will be assessed by your peers, the TA's and the instructor. Your participation on the days of the presentations will

also contribute to your grade.

Project: A primary objective of this class is to apply the quality by design concepts and topics learned about formulation and processing to a real problem through a design of experiments approach. The project work will be integrated throughout the semester, culminating in a final written report. The details of the project will be provided in a separate document.

Homework: Homework will be given throughout the class. All homework must be entirely a student's own work. Discussion with other students on homework is encouraged, but copying from one another will be considered academic misconduct. You can ask questions regarding your homework, although you should try to think about the problems before asking the instructor or the TA(s).

Homework questions will be graded on a 3 point scale: 3 points for a fully correct answer, 2 points for a mostly correct answer, 1 point for a mostly incorrect, but on topic answer and 0 points for no answer or irrelevant answer. Your lowest homework score will be dropped when your grade for the course is calculated. No late assignments will be accepted.

Make up policy: Late homework will not be accepted, but your lowest score will be dropped when your grade for the course is calculated. Those with Institute sanctioned activity excuses will be allowed to take missed quizzes, per Institute policy. Make-up quizzes and in class activities will only be permitted when absences are due to legitimate reasons such as illness, religious observance, or other events recognized by the Institute as a valid excuse. In any case, you must contact the instructor in advance of the quiz via email to schedule a make-up quiz and provide documentation from the Institute through the Dean of Students. If you do not contact the instructor in advance, it may not be possible to schedule a make-up quiz. Whenever possible, make-ups will be administered during the week following the scheduled date of the quiz. Make-up quizzes may be different from those administered during the regular period.

Extenuating Circumstances: Please be sure to meet with the Dean of Students if you encounter extenuating circumstances that interfere with your ability to attend class and/or prepare for quizzes. The Dean's office is your best resource so that you do not need to discuss the details of your personal situation with the instructor.

Grade Accuracy: Errors in grading and/or recording of scores must be addressed within 7 days of posting on Canvas by contacting the instructor and the TA in writing via email. Disputes after this one-week period will not be considered.

Academic Integrity: All students in this class are expected to respect the *Georgia Tech honor code* and behave in a professional manner when it comes to academic integrity. Copying from other students (current or former) or websites is considered an honor code violation. Any students violating the honor code or suspected of academic misconduct will be turned over to the office of Academic Integrity, Dean of Students to investigate the incident(s). Cheating off of anyone else's work is a direct violation of the GT Academic Honor Code, and will be dealt with accordingly. For any questions involving any Academic Honor Code issues, consult the instructor, the teaching assistants, or www.honor.gatech.edu.

Electronic Devices: The following are required technological expectations for this course. If you do not have access to devices and internet that meet these requirements during class times, you may not be able to complete all required items and earn your full grade.

- Computer or tablet with Windows 10, MacOSX 10.13, or ChromeOS 79 and higher
- Broadband internet connection with speed of 1.5 Mbps download, 750 Kbps upload

The only electronic devices that you may use during a quiz are the computer or tablet you are taking the quiz on and a commercially available calculator that cannot communicate with other devices without a direct physical connection (i.e., no wireless, IR or other communication capabilities). Programmable and graphing calculators are allowed, but their memories should be appropriately cleared. The use of any mobile/wireless communication device (smart watch, cell phone, etc.) during a quiz is strictly forbidden except for 2-factor authentication at the start of the quiz. Please be sure to put away your cell phones and watches before the quiz begins.

Accommodations: The Georgia Institute of Technology encourages qualified persons with disabilities to participate in its programs and activities. If you anticipate needing any type of accommodation in this course or have questions about physical access, please tell the instructor as soon as possible.

Recordings of Class Sessions and Required Permissions:

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. If class recordings, lectures, presentations, and other materials are posted on Canvas they are for the sole purpose of educating the students currently enrolled in the course.

Students may not record or share the materials or recordings, including screen capturing or automated bots, unless the instructor gives permission.

Course Outcomes: The primary course objectives are as follows:

1. Understand and apply quality-by-design principles for material goods
2. Be familiar with and apply tools for quality-by-design including fishbone diagrams, impact tables, voice of customer analysis and more
3. Be familiar with topics in polymer science related to formulation design including solubility, polymer molecular weight and chemical structure
4. Be familiar with topics in colloids and surface science including colloidal stability, particle size distributions, and chemical modification strategies
5. Distinguish between different material processing technologies and be able to select which are most appropriate for which systems
6. Understand and apply basic design of experiment approaches including full factorial, fractional factorial and screening
7. Make design decisions based on design tools and design of experiments results
8. Communicate design decisions and rationale in written form suitable to professional communications environments (industry, academia)