Prerequisites: None


Lecture period: T-Thurs, 8 – 9:30 AM

Course Outline: I will discuss the diverse physical states and associated properties of polymeric materials -

Topics to be covered include:

Basics of Polymer chains - Chain confirmations, both in solution and in melts - Various models for chain dimensions

Rubber Elasticity: Theory, experimental details - Some unusual networks, filled networks: Will touch on how rubber elasticity can be utilized for heat engines among other novel applications.

Glass Transitions and the glassy state: Phenomenology of the glass transitions (including metallic glasses), models of glass transitions, Dependence of glass temperature on various parameters, and structural relaxation in polymers above Glass Temperature

Crystallization or Crystalline State: Thermodynamics of crystallization and melting of homopolymers, crystallization kinetics, structure and morphology

Liquid Crystalline State: General Concepts of Liquid Crystals, Physics of liquid crystals including optics and applications in fibers, and displays

Viscoelasticity and flow in polymer liquids: Concepts and definitions, Linear Viscoelasticity and Nonlinear Viscoelasticity, Structure-property relations, molecular theories

Also, a general introduction to molecular aspects of all of the above will be discussed including some characterization tools - Spectroscopic methods and Scattering methods (including Neutron scattering)
MSE-8803 STRUCTURE PROPERTY RELATIONSHIPS OF POLYMERS

Exams
   Exam 1 (Time and date will be specified – very likely in late February)
   Exam 2 (early part of April)
   Final Exam

Student Paper: (Tentative – Will discuss in class)
   Students may be required to prepare a Research Proposal based on the course that can be sent out for evaluation. The proposals will be evaluated more than likely by a panel that will be set up comprising of students from the class. So, you decide the grade the proposals receive!

From time to time you will be given current papers and will be asked to discuss those papers in class. You will have sufficient time to prepare for these.

Summary of Course Grading Policy:

   Two 1-Hour Exams 40%
   Final Exam 30%
   Research Proposal or a Seminar 30%

Course Policy:

   The course is quite conceptual in nature and will require you to understand the material rather than memorize things for an exam. If you do not understand the material well, then the exams as judged by you will be difficult. Hence, spending time to understand the fundamental concepts is quite important.

   All the topics included may not be fully covered, while new topics may be included, depending on the need of the students. Often times covering all the topics comes at the expense of the student(s) learning the material and having a good understanding of the subject matter. Understanding of the material is defined as your ability to explain things to others in a clear fashion. You may be called upon to explain certain concepts to the class from time to time just so I know to what extent you have understood the material. You may also be given papers from the literature that you will be responsible for, and again, understanding the literature is quite important.

   Questions before, during, or after class are most welcome. Please do not hesitate to ask questions no matter how silly you might think the question is. Usually what one considers to be, “silly” questions, are the ones that lead to a better understanding of the material.

   There will be no make-up exams for any missing one, unless there is written cause such as medical records, etc. In this case, the student must inform me before the exam.
Honor code

GT Academic Honor Code will be strictly enforced. Adherence to Georgia Tech’s Honor Code is expected. All suspected instances of academic misconduct will be reported to the Dean of Students. It is under your responsibility to ask for clarification if collaboration guidelines, test taking policies, etc., are not clear. You will find detailed information at:

http://osi.gatech.edu/content/honor-code

Attendance policy
Attendance will be taken at the beginning of each class

(http://www.catalog.gatech.edu/rules/4/).

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 study body. These basic expectations for both of us are listed under:

http://www.catalog.gatech.edu/rules/22/.

Miscellaneous
In the classroom, cellphones are to be turned off or in silent mode. Mobile devices are allowed for the purpose of taking notes but any other use that may distract from the class is prohibited.

Disabilities
Georgia Tech offers accommodation to student with disabilities. If you need any accommodation, please inform Dr. Boussert and Ms. Guyot and provide a certificate from the Office of Disability Services.