CHEM 6483 Chemistry of Electronic Organic Materials Syllabus

Section A, 3 Credit Hours
Course Prefix and Number: CHEM 6483
Term: Fall 2026

Instructor Information

Instructor: Erin Ratcliff
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General Course Information

Description

This course provides a broad description of the basic chemical and physical concepts that determine the properties of electrically active materials. Fundamental relationships between molecular structure and optical, electronic, and transport properties of organic semiconductors, with a focus on changes in properties from single molecules to aggregates to bulk solids. Emphasis will also be given to interfaces and experimental characterization strategies. Material characteristics will be studied in the context of devices where organic materials show promising performance: transistors, photovoltaics, energy storage, and bioelectronics/sensor applications.

Course Learning Outcomes

After completing this course, students will be able to:

1. Describe the electronic structure of pi-conjugated organic molecules and polymers and the relationship to the electrical and optical properties
2. Describe basic concepts of the conducting and semiconducting properties of organic materials and relevant characterization tools to evaluate properties
3. Understand the transport properties of organic materials across multiple length scales and interfaces
4. Make connections between the electronic and optical properties of organic materials and the basic operation of organic electronic, photonic, and energy storage devices

Required Course Materials

Notes, developed from the current materials literature will be provided. Access to chemical, physical, and engineering literature is required, as well as access to textbook, via library website (instructions provided). Access to ChemDraw is required as there are several assigned activities.

Grading Policy:

Your final grade will be assigned as a letter grade according to the following scale:

A 90.0 – 100%
B 80.0 – 89.9%
C 70.0 – 79.9%
D 60.0 – 69.9%
F Less than 60.0%

This will be done based on the following percentage breakdown:

- Midterm Exam #1: 30%
- Midterm Exam #2: 30%
- Written Project: 30%
- Oral Presentation: 10%

Description of Graded Components

The written and oral project will consist of (a) a literature survey of at least five pages in length and (b) a 10 minute presentation. (i) A minimum of at least five articles in the peer-reviewed literature need be included in the review, (ii) connections between the articles and the material discussed during the course need to be made; and (iii) should include a hypothesis and proposed research activity to test the hypothesis. A template for the document will be made available. Articles need to be from the current literature, which we will define as 2020 to the present.

USG Required Course Policies

Attendance and/or Participation

This course will meet on Wednesdays and Fridays from 11:00 am to 12:15 pm in Room 152 of the Success Center. Students are responsible for all information and materials presented in the lecture whether they were present or not.

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. Review the Student Code of Conduct and the Academic Honor Code, especially Appendix A: Graduate Addendum to the Academic Honor Code.

Students are expected to perform research in an ethical and responsible manner.

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.

Allegations of scientific or scholarly misconduct are handled in accordance with the procedures outlined by the Policy for Responding to Allegations of Scientific or Other Scholarly Misconduct.

Core IMPACTS

Not applicable.

Additional Georgia Tech Required Policies

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (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 me as soon as possible in order to set up a time to discuss your learning needs.

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 student body. The Student-Faculty Expectations articulate 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.