Advanced Graphene Technology Syllabus

VVT, Variable Credits

Wednesdays, 9:30-10:20am, Van Leer E465 (Primary), Centergy One Building Suite 420 (Lab), Love Building 138 (Lab)

Instructor Information

Instructor	Email	Drop-in Hours & Location
Dr. Jinho Park	Jinho.Park@gtri.gatech.edu	Centergy One Building, Rm418 Email for an appointment
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General Course Information

Description

This course offers an in-depth exploration of graphene, a transformative material celebrated for its peerless electronic, thermal, and mechanical properties. Moving beyond theoretical physics, students will investigate the practical integration of graphene into next-generation technologies, specifically its role in optimizing lithium-ion batteries and electrochemical capacitors through enhanced energy density and accelerated charge/discharge rates. The curriculum further examines graphene's utility as a high-performance additive capable of drastically improving strength-to-weight ratios and conductivity in composite materials. By bridging rigorous academic study with hands-on laboratory experimentation, the course empowers students to master the production, characterization, and real-world application of graphene-related technologies, preparing them to lead in the evolving field of advanced materials science.

Pre- &/or Co-Requisites

There are no pre-requisites or co-requisites for this course.

Course Goals and Learning Outcomes

During this course students will:

1. Develop skills in background research and learn how to conduct an in-depth literature review.
2. Design and conduct an experiment relevant to the graphene technologies.
3. Learn how to properly document their research and experimental progress.
4. Learn how to properly collect and interpret data, and gain understanding the importance of control measurements and statistical significance.
5. Gain experience deploying various tools for sample preparation and measurement.

Course Requirements & Grading

VIP teams function like real-world project teams. Members work on different aspects of a shared project, ranging from sophomores to graduate students, and from first-time participants to those with multiple semesters of experience. Students may enroll for variable credit hours, which are considered in grading. **Note:** Zero-credit enrollment is reserved for paid participants and follows the same grading criteria.

Grading Overview

Each student is evaluated across three core areas, with three mandatory requirements. Regardless of role or experience, students must demonstrate achievement in all three areas:

1. **Documentation and Records (33%)**
   - Maintain individual documentation (required).

- Contribute to team documentation: VIP Wiki, blog

2. **Personal Contributions (33%)**
   - Complete assigned research and reports.
   - Engage actively in the project.
   - Pursue knowledge relevant to the project.
   - Contribute to technical progress.
   - Experienced members may also contribute to project management.
3. **Teamwork and Interaction (33%)**
   - Participate in peer evaluations. Failure to submit results in a full letter grade deduction.
   - Attend meetings on time.
   - Collaborate toward team goals.
   - Coordinate and assist teammates.
   - Contribute to team presentations.

Grading Scale

Student grades will be based on meeting specified expectations as outlined in the rubric.

A = meets expectations on 12 standards and meets all * expectations
B = meets expectations on 10 standards
C = meets expectations on 8 standards
D = meets expectations on 6 standards
F = failed to meet expectations

Grading Rubric

Standard Met	Area	Expectations
	Documentation (1/3 of grade)	
___	Consistent to-do lists	Leaves each meeting with work to do; checks items off list as tasks/work are completed; progress/work can be tracked over time.
___*	Explanation of what was done (in individual notebook/documentation)	Sufficient explanation of work, progress, and next steps. Someone knowledgeable/skilled in the field would be able to understand decisions made, repeat what was done, and obtain the same result.
___	Reflects on what did/did not go well	Discusses what did and did not go well with experimental design, setup, and testing.
___*	Team-level documentation	Detailed design notes, design decisions, copies of or pointers to code or models created, records of important websites, etc.
___*	Individual contribution documentation	Document individual contributions and efforts made throughout the semester. All relevant experimental data, code, and models should be provided to the instructors in the final report or supplemental materials.
	Contributions (1/3 of grade)	
___	Proactive	Identifies or asks for tasks to do; does not stop working and searches for solutions when obstacles arise – checks team documentation, searches online, reaches out to teammates, etc.
___	Learning	Acquires knowledge or skills needed for the project.
___	Quality of effort	Work is timely, thorough, and accurate; Student comes to meetings prepared.
___*	Attendance	Attended all weekly meetings, and contributed fairly to work outside of class time.
___*	Appropriate level of contribution	**Considering the course level and number of credit hours**, contributions to the project were appropriate. Early-stage contributions may include obtaining skills needed to do the work.
	Teamwork (1/3 of grade)	
___*	Attitude and participation	Demonstrates interest in the project; treats teammates with respect; pays attention to the people speaking during meetings; avoids distractions during meetings; participates in discussions around others' work; acknowledges the value of others' contributions.
___*	Engages with others' work	Knows what others on the team/subteam are doing; checks in/stays abreast of their progress; gives teammates constructive feedback and suggestions; helps or provides guidance to teammates; helps keep the team/subteam moving forward.
___	Communicates well	Facilitates communication within the team; exchanges relevant information with teammates; clear and timely communication.
___	Adaptable	Able to pivot when plans change or problems arise; willing to accept help; solicits and listens to suggestions and feedback; uses suggestions and feedback to improve.
___**	Peer evaluations	Completed peer evaluations by the deadline. Provided thoughtful feedback.

* Required in order to earn an A.

** Required in order to earn an A. Not completing peer evaluations is associated with a letter grade reduction. (This is a policy of the VIP Program)

Course Materials

Materials/Resources

Each student will be given a lab notebook to document their work. Experimental resources and personal protective equipment will be provided as needed on a project-by-project basis.

Course Website and Other Classroom Management Tools

Peer evaluations are administered by the VIP Program Click Here to access peer-evaluations from off campus. Click here to access from on campus. You will be prompted to sign in. Users can only log in from on campus or via VPN. Students can only access the peer evaluation portion of the system during active evaluation periods.

Course Policies, Expectations, & Guidelines

VIP is a collaborative, multidisciplinary, project-based learning and research experience. Your success in this course depends not only on your technical contributions but also on your active engagement with your team and the broader learning process.

Your Role in the Learning Process

As a VIP student, you are expected to:

- Take initiative in exploring and applying knowledge relevant to your project.
- Collaborate effectively with team members across disciplines and experience levels.
- Document your work thoroughly.
- Reflect on your learning and contributions throughout the semester.

This course is a real-world team environment, where learning is dynamic, self-directed, and collaborative. Your growth depends on your willingness to engage, contribute, and learn from others.

Team Meetings and Participation

Attendance and active participation in **team meetings** and **sub-team meetings** are required. These meetings are essential for:

- Coordinating project tasks and timelines.
- Sharing progress and receiving feedback.
- Learning from peers and mentors.
- Contributing to team decisions and direction.

Failure to attend meetings without valid reason may negatively impact your grade and your team's progress. If you anticipate missing a meeting, communicate with your team and advisor in advance.

Use of External Resources

You are encouraged to consult external sources to support your learning and project work. However:

- Do **not present someone else's work as your own**.
- Always **cite and reference** external materials used in your notebook, code, presentations, or other deliverables.
- Proper attribution is essential to maintain transparency and integrity in a collaborative research environment.

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 Georgia Tech's Honor Code and the student Code of Conduct.

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.

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.

Attendance and/or Participation

Students are expected to attend all Tuesday class sessions. Absences may be excused on a case-by-case basis for illness or other obligations provided students communicate with the professor about any conflict or illness (this should be done prior to the missed class whenever possible).

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Extensions may be provided if requested prior to due date. Attendance at final presentations is required. If for some reason a student is unable to attend final presentations, he or she should contact the professor to explain the circumstances.

Inclement Weather and Digital Learning Days

Inclement weather will be addressed on a case-by-case basis. An e-mail will be sent prior to class informing of cancellation or to provide details for a remote learning session as needed.

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.

Student Use of Mobile Devices in the Classroom

Students should refrain from cell phone use during class. Use of laptop computers and tablets are permitted for class related research and documentation.

Additional Course Policies

VIP Room and Equipment Use Policy

VIP rooms and equipment are shared resources used by multiple teams. To ensure a productive and respectful working environment, the following rules apply:

1. Room Usage Priorities

Room use is prioritized as follows:

1. Scheduled team meetings, lectures, and learning modules
2. Weekly sub-team meetings (multiple groups may share the space)
3. Video conferences or special meetings with VIP stakeholders
4. Other project-related work (multiple groups may share the space)

Room schedules are available on the VIP website.
Note: A "good neighbor" policy applies—students may use rooms during other activities as long as they do not cause disruption. Quiet individual work or studying is allowed when it does not interfere with scheduled uses. Similarly, multiple groups may use a VIP room at the same time.

2. Cleanliness and Conduct

- Everyone is responsible for keeping rooms clean.

- Food is allowed, but spills must be cleaned immediately.
- **Gum must be disposed of properly—do not stick it under desks or on carpets.**
- Rooms are monitored by cameras; violations may be reviewed via video.

3. **Equipment Use**

- Equipment may be designated for general use or assigned to specific teams.
    - General use examples: Projector in Van Leer E465.
    - Equipment assignments may change each semester.
- If unsure about equipment access, contact: vip-request@ece.gatech.edu
- Use equipment only for its intended purpose. Misuse may pose safety risks.

Important Equipment Rules:

- Equipment may not be removed from VIP rooms without a signed loan agreement approved by a VIP Director.
- You are financially responsible for any equipment not returned in good condition.
- You must know how to operate equipment safely. Approval to use equipment does not imply safety training has been provided.

4. Computer Accounts

- Accounts are for individual use only—do not share with others.
- All usage must comply with Georgia Tech, USG Board of Regents, and State of Georgia policies.
- Respect privacy and data integrity. Having access to a file does not mean you are authorized to read or modify it.

5. BuzzCard Access

- Access is a privilege and is logged.
- Rooms are under video surveillance. In cases of theft, vandalism, or messes, logs and footage will be reviewed.
- Do not allow unauthorized individuals into VIP spaces.
- Always secure the room (close the door) when leaving.

Campus Resources for Students

Undergraduate Student Academic Success Resources:
A list of resources for undergraduate students' academic success and information about advising can be found at Success at Tech.

- 1:1 Tutoring: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Georgia Institute of Technology has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit gatech.joinknack.com and sign in with your student account.

Graduate Student Academic and Professional Success Resources:
A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- Professional Development such as the programming from the Career Center and other professional development resources and events"]

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)

Course Schedule

Week	Activity/Event
Week 1	Introductions Graphene background presentation Discussion of semester goals
Week 2	Sub-team information
Week 3	Sub-team selections finalized Sub-team meeting times finalized
Week 7	Web-based peer-evaluations released for students to complete. Online form due by end of the day Friday. Late submissions will not be accepted.
Week 7	**Midterm presentations**
Week 8	Midterm grades for 2000-level courses due in OSCAR (S for satisfactory, U for unsatisfactory).
	Withdrawal Deadline
Week preceding finals	Web-based peer-evaluations released for students to complete. Online form closes at 11:59PM on Tuesday. Late submissions will not be accepted.
Last week of class	**Final presentations**
Finals Week	Turn in final reports and individual VIP documentation for final grading.