VIP 2601/3601/3602/4601/4602 Syllabus

AR/VR for Multiphysics Education, All Sections, Variable Credits

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Instructor Information

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General Course Information

Description

This interdisciplinary, project-based course challenges students to develop immersive VR/AR content that involve multiple physical phenomena (electromagnetic, acoustic, thermal, structural, etc.), preferably in the context of electric machines. An immersive and interactive VR environment will foster situated learning, improving performance and knowledge transfer. We can leverage the visual, auditory, and haptic feedback of VR technologies to help users understand complex systems. For heat transfer, we may use colors to represent temperature; for acoustics, we may play audio; for structural mechanics, we may use haptic feedback to indicate how stiff a physical object is; for electromagnetics, we may use color and audio to represent strength and frequency; etc.

Course Learning Outcomes

By the end of this course sequence, students will be able to:

1. Display 3D objects in AR/VR devices
2. Interact with 3D objects in AR/VR devices
    1. Zoom in/out
    2. Rotate
    3. Slice
3. Overlay multiphysics information (electromagnetic field, sound, temperature, stress, *etc.*) with 3D objects

4. Coordinate audio and video
5. Create contents in the following domains
    1. Electromagnetics
    2. Thermal
    3. Structural
    4. Acoustic
6. Develop relevant hardware (such as joysticks) to assist with interacting with AR/VR devices (for students with hardware preference)
7. Create modules related to electric machines including
    1. Inductors
    2. Transformers
    3. DC motors
    4. Synchronous machines
    5. Induction motors

Required Course Materials

No textbook is required.

Apple Vision Pro and Mac will be provided for AR/VR content development

Grading Policy:

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

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Assignments

- Weekly documentation
- Team wiki
- Final presentation

(specification grading will be used, rubrics are provided at the end of this document)

Description of Graded Components

1. **Documentation and Records (33%)**
   - Maintain individual documentation.
   - Contribute to team documentation: VIP Wiki, blog (based on Microsoft OneNote)
   - Students are required to create a new page each week.
   - Students are required to submit their documentation by the end of each week to Canvas.
2. **Personal Contributions (33%)**
   - Complete assigned tasks 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.

Course Policies

Attendance and/or Participation

Students are required to attend weekly meetings. 3 absences are allowed without penalty in grading.

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 plagiarism 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.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated career competencies. This resource developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

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.

Pre- &/or Co-Requisites

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

Extra Credit Opportunities

N/A

Collaboration, Group Work, and Use of Generative AI

Students are encouraged to work together on homework assignments. However, you must submit your own version of the assignment. You are expected to complete the midterms and final exam yourself, without any external help or communication.

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

Students are expected to turn in weekly documentation by the end of the week. Late by 2 days is acceptable.

Inclement Weather and Digital Learning Days

If a weather-related event affects campus operations, we'll follow guidelines provided by Georgia Tech.

Student Use of Mobile Devices in the Classroom

N/A

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 Klaus 1440, monitors in VL 465 and VL 463B.
    - 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:

- Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

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	Date		Activity/Event
Week 1	TBD		Introductions Overview of team's work Discussion of semester goals …
Week 2	TBD		Sub-team selections finalized Sub-team meeting times finalized
Week 2-3	TBD		Verification of Student Participation in Class Due by Friday at 4pm
Week 7	TBD		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 8	TBD		Submit individual VIP documentation for mid-term grading.
Week 8	TBD		Midterm grades for 2000-level courses due in OSCAR (S for satisfactory, U for unsatisfactory).
	TBD		Withdrawal Deadline
Week preceding finals	TBD Open	 Close	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	TBD		Final presentations Turn in individual VIP documentation for final grading.
Finals Week	TBD		No final. No assignments.

Specifications Grading

(Binary: Student Met or Did not Meet Standard)

Student meets or does not meet specified expectations.

A = meets expectations on at least seven standards (listed below) and meets all *standards.

B = meets expectations on at least six standards.

C = meets expectations on at least four standards.

Standard Met	Area	Details
	Documentation (1/3 of grade)	
___*	Explanation of what was done	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.
	Contributions (1/3 of grade)	
___	Proactive	Identifies or asks for tasks to do; does not leave weekly meetings without work to do, suggests next steps; does not stop working and searches for solutions when obstacles arise – checks team documentation, searches online, reaches out to teammates, etc.
___	Quality of contributions	Work is timely, thorough, and accurate; comes to meetings prepared.
___*	Appropriate level of contribution	**Considering the course level and number of credit hours**, contributions to the project were appropriate. Contributions may include obtaining skills needed to do the work, reading documentation, etc.
	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; asks thoughtful, relevant questions; acknowledges the value of others' contributions.
___*	Engages with teammates' 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	Communicates clearly and in a timely manner; exchanges relevant information with teammates; facilitates communication within the team.
___	Receptive to feedback, suggestions and help	Solicits and listens to suggestions and feedback; willing to accept help; uses suggestions and feedback to improve.

* Must meet expectation in order to earn an A.