# Configurable Computing & Embedded Systems VIP

Spring 2027

## Overview

The goal of this class is to study the embedded architecture of high-assurance systems, and to provide a trusted computing base for these systems through the development of custom, assurance-focused hardware. We will demonstrate these concepts and knowledge through the development of an open-source voting system based on a RISC-V processor.

## Instructors

Dr. Chris Clark– Lead Instructor – Chris.Clark@gtri.gatech.edu
Ms. Rachel Vaught – rachel.vaught@gtri.gatech.edu - Office hours in Centennial Research Building by appointment

## Required Course Materials

None

## Class Resources

- Slack – gt-rces-vip.slack.com
- GitHub - https://github.gatech.edu/ConfigurableComputing
- Class Server (public facing Linux machine) – 130.207.202.4

## Grading

### Grading Scale

Despite being a highly technical course, VIP is generally graded on effort and continued progress toward an end goal even if intermediate steps are less tangible, or strictly speaking, "incorrect". Your overall grade reflects following categories, potentially over the course of multiple semesters. Learning necessary skills along the way counts!

For technical achievements (33% of your total grade), we want to see **one or both** of the following:

1. Developing the skills needed to advance the project
2. Actually advancing the project (from a technical perspective)

For documentation (33% of your total grade), we want to see **ALL** of the following:

1. Judicious use of all Github documentation features
    a. Individual Wiki entries on your task to inform users about technical objectives and overall progress towards your goals
    b. Github Notebook to serve as a personal log book of the work and effort you have put in throughout the semester, capturing notes from your individual subteam meetings, your

classroom time, as well as detailed logging of your technical tasking and general research.

For classroom/teamwork achievements (33% of your total grade), we want to see **ALL** of the following:

1. Excellent demonstration of teamwork, and contributions to the dynamics of your individual subteam.
2. Consistent participation in all classroom requirements, to include:
    a. Consistent classroom attendance throughout the semester during our specified classroom period.
    b. Classroom working days (leverage these days to interact with instructors, your teammates, and members of other teams)
    c. Presentations (contribute to each team status update and presentation, preparing slide material and presenting your materials)
    d. Complete VIP Peer Evaluations (Midterm and Final) on time as required

## Grading Breakdown

- Technical Achievements (33%)
    - Github Usage (Code, design reviews, commit cadence, pull requests, wiki research contributions, etc) (20%)
    - Demonstrations of technical achievements (diagrams, mock-ups, videos, physical prototypes, etc) (13%)
- Documentation (34%)
    - Notebook (Individual GitHub Wiki) (17%)
    - GitHub Issue Tracker (17%)
- Teamwork and Participation (33%)
    - Attendance / Participation / Peer Reviews* (18%)
    - Presentations (15%)
        - Kickoff Presentation
        - Midterm Presentation
        - Final Presentation

* Not completing peer evaluations is associated with a letter grade reduction. This is a policy of the VIP Program.

Your grade reflects the evidence we see that you're meeting these items:

- A – You're showing above average evidence of all 3 grading pillars above
- B – You're showing average evidence of all 3 grading pillars above, with small deficiencies in one or two.
- C – You're showing effort but showing below average evidence for all three grading categories.
- D – You're not showing evidence of effort
- F – You're not participating in class objectives at all

## Grading Adjustments Based on Credit Hours

Student work expectations are relative to their number of credit hours and seniority. A 2-credit hour student is expected to do double the work of a 1 credit hour student. A student's total effort (excluding class time) is expected to be 3 times the number of credit hours:

- 1 CR student => 3 hours/wk
- 2 CR student => 6 hours/wk
- 3 CR student => 9 hours/wk

All graded components listed above will be weighed appropriately based on the number of credit hours the student is signed up for. Students with higher credit hours will be expected to produce more {code, wiki entries, Issue tracker updates, Notebook entries, more tangible technical progress, etc}.

## Description of Graded Components

### *Technical Achievement Artifacts:*

#### *GitHub Usage*

Students should engage at some regular cadence with any repository in the class organization. Students should open an issue (see below in Documentation Artifacts section), and link a branch to it as soon as possible. Instructors want to a see a regular commit cadence (weekly or more if possible) so we know you're making a consistent effort. It's OK if some of these commits do not compile or produce correct results.

Students should do their work under a branch associated with their github issue. Examples:

- 16-gpio
- 62-hdmi-integration

**In the second half of the class (or as soon as the student is ready), students should commit more regularly and request design/code reviews from peers and instructors.**

For students who are new to the class and are primarily coming up to speed with technologies, or otherwise have a more research-heavy task, this grading criteria can be achieved through documented proof of learning and exploration throughout the semester. This potentially includes: individual Guthub project/page tracking learning tasks, judicious use of notebook or Github issue tracker to document research being conducted in detail, developing how-to/training guides for technologies as they are learned, etc.

#### *Demonstration of Technical Achievement*

Students are required to demonstrate technical achievement of actually advancing the project from a technical perspective. This can be in the form of diagrams, mock-ups, videos, physical prototypes, technical writeups, etc. At midterms, students will define what their technical achievement for the semester will be, and they will be graded at the end of the class based on what they submitted at midterms.

Rubric for Technical Achievement definition and grading is uploaded to Canvas.

### *Documentation Artifacts:*

#### *Notebook*

Notebooks should track subteam meeting notes, classroom meeting notes, ongoing TODOs for your specific tasking (with evidence of completion), and all background research and learning progress made. The format is not stringent, as long as it contains all the desired elements. Each entry should be dated individually so that we can grade consistency.

Notebooks should be **individual** wiki pages, added as a link to the main notebook wiki page.

Some past notebooks of high quality are listed.

Feedback will be provided using the simplified VIP Notebook rubric, which is uploaded to the class Canvas page.

#### *GitHub Issue*

GitHub issues should track all technical research and progress on a students specific tasking. It should include technical todo-lists, technical research resources and findings, including relevant code snippets, pictures, or waveforms. Content should be included especially when the code runs but doesn't produce a correct result. Your GitHub issue should be assigned to you, with your branch linked. It should include only updates and information related directly to the progress of the technical tasking – background research and learning, meeting notes, and the like should be documented in your notebook instead.

Feedback will be provided using the class GitHub rubric, which is uploaded to the class Canvas page.

### *Teamwork and Participation Artifacts:*

#### *Presentations*

Presentations help all instructors and your classmates stay up-to-date on where you're at in the context of the end goals of the class. This semester there will be two types of presentations given.

1. Interim status presentations.
    a. These are short status reports given verbally (with or without the use of backing slides) in class detailing the current status of the team efforts, to include current work status, issues/blockers, and next steps. Team Leads will take lead on navigating their team status update for the class.
2. Midterm/Final Project Status presentations
    a. These presentations are much more comprehensive and should include:
        i. An overall Project objective and overview
        ii. What is your team's vital role in the success of this project
        iii. What is(are) your design(s) or research tasks
        iv. How does your design fit into the larger project
        v. Where are you in the roadmap to your end goal (hint: this requires a roadmap/timeline)
        vi. What are your challenges/blockers?
    b. Students should avoid a lengthy description of everything they've tried up to this point. This is captured by other mechanisms like Interim status reports, Notebooks and GitHub issues.

### *Attendance / Participation / Peer Reviews*

Students should attend all classes and subteam meetings; if a conflict prevents attendance, prior notice should be provided to instructors and team lead. Students should engage with their subteam and the full team as appropriate via the Slack and via peer reviews. Students with borderline grades and positive engagement across Slack and peer reviews are much more likely to have their grade bumped up.

## Methods of Feedback

Feedback will be provided through Canvas assignments, or directly/verbally as appropriate.

Students/teams can request an informal review of material by an instructor at any time. This includes notebook reviews, presentation reviews, technical consultations, etc. Any formal inquiries into midterm and final grades should be sent by email so it's on official record.

## Course Policies, Expectations, and 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.

## 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.