

# VERTICALLY INTEGRATED PROJECTS (VIP): GALAXY EVOLUTION

Weekly All-Hands Meeting: Mon | PMA 15.202A | 4:00p-5:00p

Weekly Hack Session: Wed | PMA 15.216B | 4:00p-5:00p

## PI

### Prof. Steven Finkelstein

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Open hour: M 3-4p

## Postdoc Leaders

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Help Sessions: TBD

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## Graduate Students

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## Senior Leaders

## What is the VIP program about?

The Vertically-Integrated Projects (VIP) Program operates in a research and development context. When you join our team you will earn academic credit for your participation in research efforts that assist faculty, postdocs and graduate students in their areas of expertise. The teams are:

*Multidisciplinary* - drawing students from multiple disciplines

*Vertically-integrated* - a mix of sophomores through PhD students

*Long-term* - each undergraduate student may participate in a project for up to three years and each graduate student may participate for the duration of their graduate career.

The continuity, technical depth, and disciplinary breadth of these teams are intended to:

Provide the time and context necessary for you to learn and practice many different professional skills, make substantial contributions to the project, and experience many different roles on a large, multidisciplinary VIP team.

Support long-term interaction between yourself and graduate students and postdocs, who will mentor you as you work on VIP projects embedded in their research.

Enable the completion of large-scale projects that are of significant benefit to faculty members' research programs.

## VIP Learning Objectives:

By participating in the VIP program, you will gain first-hand experience performing astronomy research, including:

- Identify and grow your professional skills through practice and reflection.
- Make substantial contributions to the team project.
- Experience different roles on a large, multidisciplinary team.
- Gain skills in self-motivation and time management.
- Experience situations where the answer isn't known.

## What is the focus of this research team?

This team focuses on galaxy evolution from an observational perspective. Using telescopes with imagers or spectrographs, we make observations to find and study distant galaxies, with an ultimate goal of understanding how our own Milky Way was formed. Our specific research typically focuses on the time of **reionization**, when energetic ultraviolet light emitted from the first stars and galaxies ionized the gas in the intergalactic medium (the material in between galaxies).

Some specific surveys we are presently using are:

- The Cosmic Evolution Early Release Science (CEERS) Survey. This survey is led at UT, and was one of the first programs executed with JWST. This includes imaging and spectroscopy.
- The Next Generation Deep Exploratory Extragalactic Public (NGDEEP) survey is a JWST deep field, which we have obtained in Cycle 1. This includes imaging, and slitless spectroscopy.
- The Hobby Eberly Telescope Dark Energy Experiment (HETDEX). This is a large unbiased spectroscopic survey being led by UT using the 10m Hobby Eberly Telescope (HET) and its VIRUS integral-field unit (IFU) spectrograph. HETDEX is in the process of discovering over one million distant galaxies on the basis of their strong Lyman-alpha emission.

## What is required to participate?

- Some python coding and background astronomical knowledge is preferred. Example preparatory courses include AST307 and AST376R. However, membership is ultimately decided by the PI, so participation is possible without these courses if you believe you have the background knowledge.
- The computers in the Astronomy Computer lab are more than sufficient for our needs, though you are welcome to use a personal computer. We do a lot of our computer processing work on the machines at the Texas Advanced Computing Center (TACC), so your computer need not be new or fast.
- What happens at the weekly meeting? During our weekly meeting we will first do updates. Every team member should make an update slide each week, on our group google slide deck, following our format. This gives you a chance to give an update on your progress, and ask questions about places you are stuck. I highly encourage other students to help answer these questions.
- Come prepared to present! You need not make a fancy powerpoint presentation, but you should come into the meeting with slides prepared with what you want to share. I encourage you to show figures as much as possible - it is much easier to diagnose a problem or give advice when you show us rather than

## Are there other weekly events?

- You will also attend a working "hack" session on Wednesdays 4-5p, in PMA 15.216B. In these sessions, you will workshop problems, work in small groups, and discuss papers.

## What do I do when I'm stuck?

- The benefits of the vertical nature of this team is that there are a lot of people to ask for help!
  - Your first stop are more senior undergraduates within the team.
  - If they can't help you, then reach out to the graduate student or postdoc who is helping to supervise you.
  - If together you can't solve the problem, then reach out to the PI.
- Questions of a personal nature or any serious concerns can *always* be emailed directly to the PI.

### How do I get compensated for my time?

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The primary way VIP students are compensated is research credits. The expectation is three hours of work for each research credit you sign up for, up to a maximum of three credits, or nine hours.

There are two types of research credits: lower division (AST1/2/310K), and upper division (AST1/2/375, or a comparable class in your major).

To be eligible to take upper division credits in this VIP program, you must first take a minimum of three lower-division credits in this group, maintaining a minimum grade of "B" or higher.

A typical progression through the VIP program could look like:

- October of sophomore year: Admission to the program, begin attending weekly meeting.
- Spring of sophomore year: 1-2 lower-division credits, begin working on initial project.
- Fall of junior year: 1-2 lower-division credits, continue working on initial project, craft capstone project hypothesis.
- Spring of junior year: 1-2 upper-division credits, begin capstone project.
- Fall of senior year: 3 upper-division or honors (397H) credits, or 5-10 hr of paid position, continue capstone project.
- Spring of senior year: 3 honors thesis credits (397H) or 5-10 hr of paid position, complete capstone project.

## Can I get paid instead?

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### During the long semesters:

Students are heavily encouraged to seek out research funding from department, college, university, or other sources, which can allow you to be paid for your time rather than earn credit.

CNS resources are compiled here: <https://cns.utexas.edu/tides/undergraduate/funding-opportunities>

There is also a University Undergrad Research Fellowship: <https://ugs.utexas.edu/our/scholarships/urf>

This is due Sept 28, or Feb 1.

There are two programs of note for students on financial aid:

TEJAS Work-Study: <https://cns.utexas.edu/tides/undergraduate/funding-opportunities>

University Leadership Network: <https://studentsuccess.utexas.edu/uln/posting-opportunities>

*\*\*\*If you qualify for either of these, please talk with me*

I do have a *small* amount of research funding available. This is unfortunately a non-renewable resource, and right now I have funding for 2-3 student-semesters per year over a three year period. This funding will thus be reserved for seniors who have completed their six credit-hours at a *high level*.

***I recognize that everyone has different financial needs, and I do not want financial hardship to stand in the way of your ability to experience research. If you need to be financially compensated, but cannot locate a fellowship, please talk to me and we will try to find a solution.***

### During the summer:

For the summer students are encouraged to broaden their horizons via external REUs, though internal fellowship funding can be applied for should they wish to continue their research over the summer (available through TIDES and the department). Look out for emails on these opportunities, and if you are interested let me know by ~January (for example, TIDES has an Advanced Summer Research Fellowship, available for those who have worked in a team for two semesters, which this year was due early Feb).

## How will I choose projects?

**Starter Project:** When you join the team after we do our application process mid-fall, you'll sit in on our group meetings for the rest of the semester, learning about what the groups are working on. At the beginning of the spring semester, the senior team members (senior undergraduates, graduate students and postdocs) will list potential starter projects. These will be designed to have you perform tasks which both give you exposure to various research techniques, but also provide a result which directly helps the senior member's project. You will work on this starter project through the fall of your junior year.

**Capstone Project:** During your first year in the program, take advantage of meetings and conversations to learn more about the work happening in the group, and to begin exploring your own curiosity. What questions come to mind? Which projects excite you the most? By the middle of your junior year, we will ask you to (with as much help from us as you want) come up with your *own* research investigation, which you will work on during the remainder of your undergraduate career. This capstone project should have a more rigorous nature than your starter project, with a true hypothesis and desired outcome. During the fall of your junior year, you should make time to talk to senior group members about ideas and questions you have, to help hone your research direction.

## How will I share my research?

A key skill you will gain by being a part of this VIP group is the skill of sharing your research. You will do this in a variety of ways:

**Internal presentations** - you will present your work to the group weekly, and we will give you feedback to help you present with greater clarity.

**Research Forum** - you will be expected to present a poster (individually, or with your sub-group) at the annual CNS Undergraduate Research Forum (<https://cns.utexas.edu/tides/undergraduate/undergraduate-research-forum>). You are welcome to present at any other local events you find, just ask!

**Winter American Astronomical Society Meeting** - During your senior year, if you are interested, talk to me about applying for funding to attend this January meeting. This is particularly useful for those interested in graduate school in astronomy, as this can be a great networking event.

**Publication** - I will be very happy to work with you to publish your capstone project if you are interested. A most likely outcome would be a AAS Research Note (-1000 words + one figure), though a full peer-reviewed publication is a plausible stretch goal. This should be kept in mind when planning goals and your time commitment for your senior year.

## How is my performance in the VIP group assessed?

The premise of VIP is teams working on projects. Much like a real-world team, individual members work on different aspects of the project. Team members range from sophomores through graduate students, from first-time participants to students who have been involved for four or more semesters. **The number of credits for which a student is enrolled is taken into account in grading.** Zero-credit students (reserved for paid participation only) participate in the same grading process. You must receive a grade of a B or higher to continue in future semesters. We will provide frequent feedback so that you are aware of your grade, as well as what could be done to improve it.

***Success will depend on you being proactive and self-motivated!***

Your grade is based on three areas, along with three requirements. Although each student contributes in different ways, you must demonstrate achievements in all three areas below. Note that your grade will apply to all credits you sign up for for this class, e.g. 110K plus any additional research credits (e.g., X10K, X75C).

1) **Attendance (35%)**

Attendance at both the Monday and Wednesday meetings is *\*mandatory\** - you should thus treat this like any other class. To account for a small number of absences, you will receive full credit (100%) in this category if you miss five or fewer class sessions. If you miss more than five sessions, your attendance grade will be the percentage of classes you do attend (e.g., if you attend 20/28 classes, this portion of your grade would be 71.4%).

To obtain credit for attending each all-hands meeting, each student should present an update slide, which should be prepared *\*prior\** to 4pm. This includes a listing of last weeks goals, a summary of your updates, any open questions, and a reflection of why you did or didn't meet your goals. Students take this course from 1-3 credits; updates should be more in-depth for students taking 2-3 credits.

2) **Paper presentation (5%)**

You will, coordinating with the Paper Czar, present a portion of a recent paper during one of the Monday meetings. This item is credit or no credit.

3) **Visit with Prof Finkelstein (5%)**

At least once during the semester, you should meet with Prof Finkelstein outside of class to discuss your project, and ask any questions you have about your project, the program, and/or a career in astronomy. If you cannot make his open hour, please contact him for an appointment.

4) **Documentation(30%)**

Maintain a VIP notebook. Your notebook may be a bound, physical notebook, or an electronic notebook (as long as it is sharable). The goal of your notebook is to keep a record for you, to better help your research progress. By having you learn these organizational skills now, we hope to help you develop into a mature researcher.

Each week your notebook should contain the following elements:

- Monday - Enter your goals for the week (at this same time, prepare your slide for the all-hands Monday meeting).
- During each time you work, keep a record of the date, how long you worked, what you accomplished, what problems you ran into. Paste in figures when relevant.
- During each all-hands or working meeting, make notes of anything potentially useful to you.
- At the end of the week, write a short reflection. Did you meet your goals? Why or why not? What can you take forward into the next week?

### What is the grading scale?\*

93.0 - 100 A
90.0 - 92.99 A-
87.0 - 89.99 B+
83.0 - 86.99 B
80.0 - 82.99 B-
77.0 - 79.99 C+
73.0 - 76.99 C
70.0 - 72.99 C-
67.0 - 69.99 D+
63.0 - 66.99 D
60.0 - 62.99 D-
< 59.9 F
<i>*no rounding</i>

We will review your notebook at the end of each semester so we can provide constructive feedback, and assign a grade. First-year members are encouraged to share their notebook earlier in the semester for feedback.

#### 4) **Progress on Research Project (25%)**

In the first week on canvas, complete the “Starting goals assignment”, and in the last week, complete the “reflection” assignment. Together these assignments, along with our assessment of your effort and progress, will make up this component of your grade. When relevant, this component will include end-of-semester posters and presentations.

## VIP Etiquette

**Attendance:** This is an in-person course, meaning that you should attend each week, in person. Do your best to minimize conflicts, much as you would do for a regular lecture course. Students unable to consistently attend the all-hands meetings (without prior approval) will not be allowed to stay in the program.

**Expectations regarding mutual respect:** Astronomy belongs to all people, independent of race, religion, gender, gender identity, gender expression, or sexual orientation. Incidents of discrimination, assault, harassment, threats, intimidation, profiling, or coercion based on membership or perceived membership will not be tolerated. Show each other respect no matter perceived knowledge or performance in this class, or any other.

**Communication:** We will communicate via email and Slack. Email is recognized as an official mode of university correspondence; therefore you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently, and make every effort to stay up-to-date on Slack.

## University Resources:

**Academic accommodations (D&A):** This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make our learning environment and activities difficult, or if you have medical information that you need to share with me, please let me know. I am committed to creating an effective learning environment for all students, but I can only do so if you discuss your needs with me as early as possible. I promise to maintain the confidentiality of these discussions. Any student with a documented disability who requires academic accommodations should contact Disability and Access at 471-6259 (voice) or 512-410-6644 (Video Phone) as soon as possible to request an official letter outlining authorized accommodations. For more information, visit <http://ddce.utexas.edu/disability/about/>. *I am also happy to meet in person virtually over Zoom to discuss more.*

**Counseling and Mental Health Center:** Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle.



You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. <http://www.cmhc.utexas.edu/individualcounseling.html>

**The Sanger Learning Center:** Did you know that more than one-third of UT undergraduate students use the Sanger Learning Center each year to improve their academic performance? All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas (including Astronomy). For more information, please visit <http://www.utexas.edu/ugs/slc> or call 512-471-3614 (JES A332).

## University and Course Policies:

**Academic integrity:** The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties. Ethical conduct is expected at all times. For example, answering Voting Questions to receive credit when you are not in class is unethical. Incidences of academic dishonesty will be reported to Student Judicial Services. For more specific information go to: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>.

You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address: <https://deanofstudents.utexas.edu/conduct/standardsofconduct.php>

**Plagiarism:** As a research university, the University of Texas at Austin takes plagiarism very seriously. Do not risk getting involved in a plagiarism infraction - the consequences simply aren't worth it. Always cite your sources, and when in doubt consult a professor or librarian. You may also read more about plagiarism at the Student Judicial Services website: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>

**Personal or Family Emergencies:** If you experience a personal or family emergency (death in the family, protracted sickness, serious mental health issues) that prevents you from attending an exam or forces you to miss multiple days of class, you should contact Student Emergency Services in the Office of the Dean of Students <http://deanofstudents.utexas.edu/emergency/>. They will work with you to communicate with your professors and let them know of your situation.

**Religious Days:** A student who is absent from a class or examination for the observance of a religious holy day will be permitted to make up the missed work, if notice is given at least fourteen days prior to such an absence.

## Classroom Safety and COVID-19

This is a science classroom and we are strongly recommending that we look to the science and follow the guidance of local public health officials and the CDC. ***To help preserve our in person learning environment, the university recommends the following:***



- **Vaccinations are widely available**, free and not billed to health insurance. The vaccine will help protect against the transmission of the virus to others and reduce serious symptoms in those who are vaccinated. The vaccines are safe, and effectively prevent against severe illness from COVID-19.
- If you are experiencing any symptoms of COVID-19, please follow university guidelines here: [https://healthyhorns.utexas.edu/coronavirus\\_exposure\\_action\\_chart.html](https://healthyhorns.utexas.edu/coronavirus_exposure_action_chart.html), including getting tested. If you test positive, you should ***isolate yourself at home***. Contact the [Behavior Concerns and COVID-19 Advice Line \(BCCAL\)](#) to report your positive result. BCCAL can also assist you with isolation options, class absence notification or other support. and if you find out that you have a positive test for COVID-19.
- If you are experiencing any symptoms of COVID-19 ***do not come to class in person***. If you are well enough to attend via zoom, please do. If not, you can use one of your six drops.
- Visit [protect.utexas.edu](https://protect.utexas.edu) for more information.