

# Systemic Reform of STEM Education: The Vertically Integrated Projects (VIP) Consortium



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# Vertically-Integrated Projects Program

Primary Goal of the VIP Program:  
Involve Everyone on Campus in Innovation

## What is Innovation?

“The development of novel products, services,  
and processes for the benefit of society” (NSF)  
(Too Narrow)

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“Inspiration plus Execution”  
(Works in all Disciplines)



# Vertically-Integrated Projects Program

## The Barrier: 3 Forms of Fragmentation

- By Mission
  - Research: Exploration, Idea Generation
  - Education: Knowledge, Skills
  - Service: Partnerships, Economic Development
- By Time
  - Semesters, Academic Years
- By Discipline



## Must Overcome These

- So Everyone can Participate
- To Create a True “University-Deep” Community



# Vertically-Integrated Projects Program

The VIP Approach: Foster Innovation by Involving Students in Challenging Projects Embedded in Faculty Research.

Ensure Success by Providing the Necessary:

TIME



CONTEXT



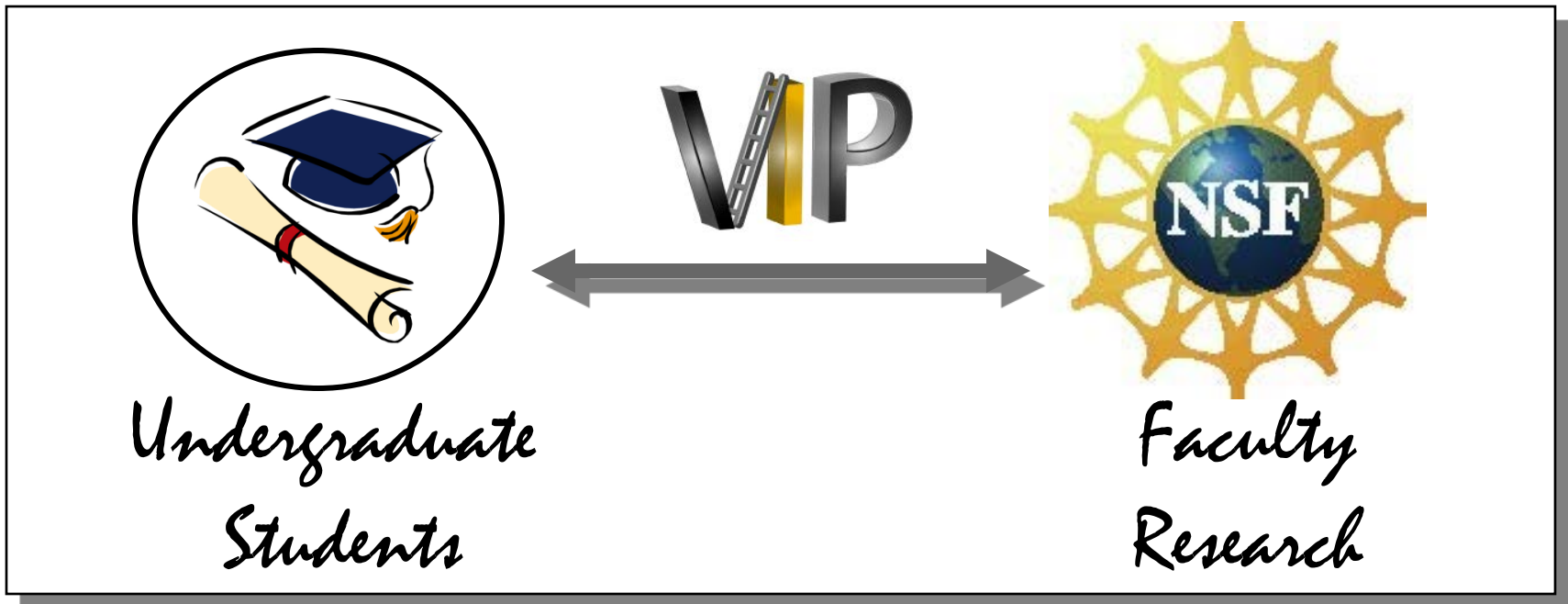
MENTORING





# Vertically-Integrated Projects Program

## Bringing People Together



Students need Real Projects  
in which they Experience  
the Innovation Process

Faculty can Benefit from  
Help at all Levels of  
The Innovation Process



# Vertically-Integrated Projects Program

## VIP Program Architecture

- Long-term, Large-scale Projects:
  - Faculty Led Projects
  - Large teams: 10-20 undergraduates; 1-4 grad students
  - Sophomores through seniors on each team
  - Long-term participation – up to 3 years per student
  - New students replace those who graduate
  - Teams continue for years, decades
  - Academic credit each semester
- Challenging, Real-World Projects







# Vertically-Integrated Projects Program

## Large Teams: The eStadium VIP Team (F'10)





# Vertically-Integrated Projects Program

## VIP Course Structure

- VIP-X00Y
  - X = Year: 2=Soph; 3=Junior; 4=Senior
  - Y = Credits: 1, 2, or 3
  - Each course can be taken multiple times
  - Currently: 2811 -- 3811, 3812 -- 4811, 4812, 4813
  - 4813 for Senior Design, Project, Thesis, or Equivalent
  - Each team is one section of every course
- Available to all Disciplines







# Vertically-Integrated Projects Program

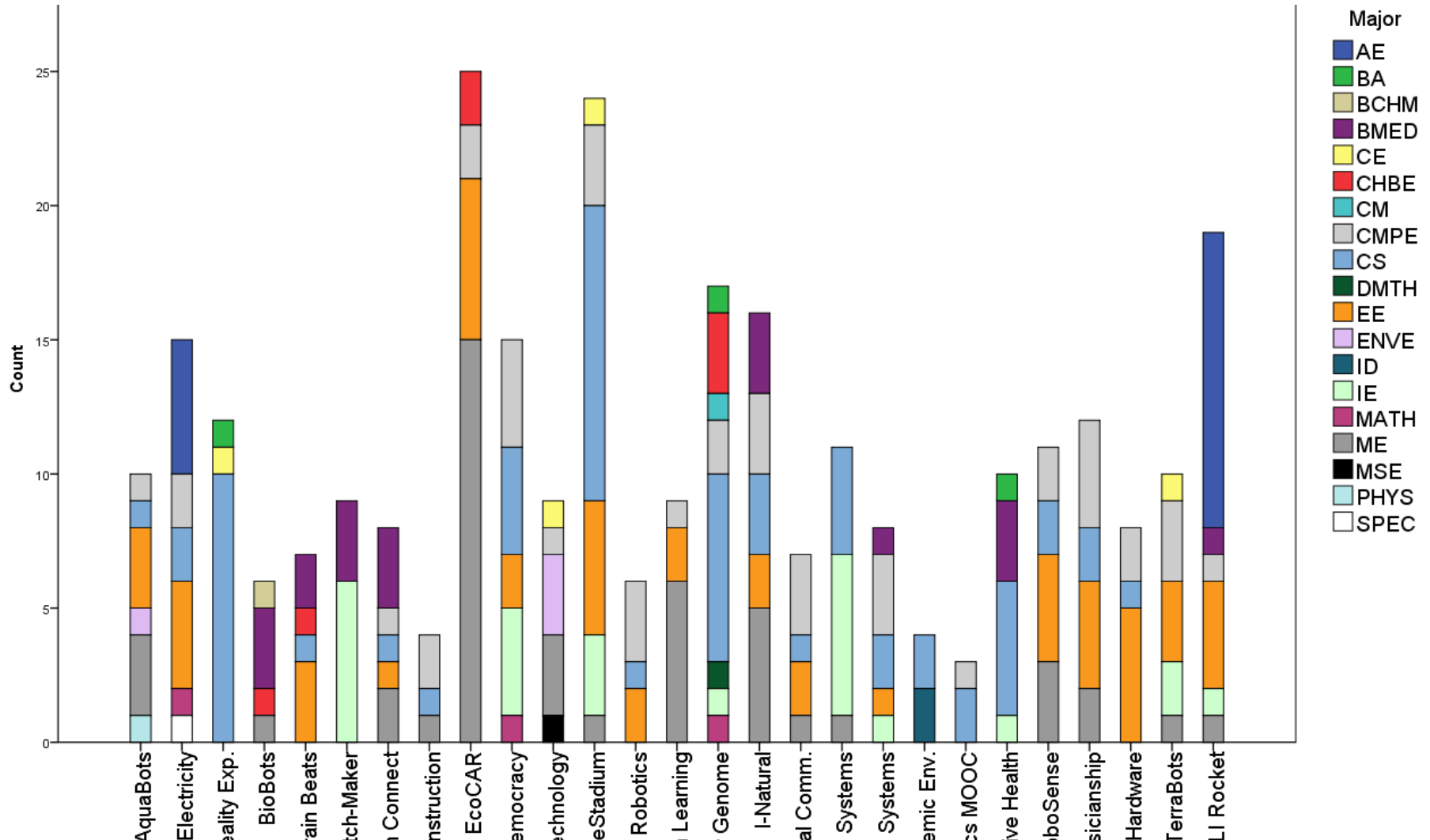
## Model for How VIP Credits Count

- Incentive to Participate Multiple Years
  - Take 5 or fewer credits:
    - All are Approved-Elective (Free-Elective) Credits
  - Take 6+ credits:
    - 3 to 6 Technical Elective Credits
    - Rest are Approved-Elective (Free-Elective) Credits
  - VIP + VIP Senior Design: 8+ Credits
    - 3+ Credits as a Junior
    - 2 Credits (4812) 1<sup>st</sup>-Semester Senior Year
    - 3 Credits of VIP Senior Design (4813)



# Vertically-Integrated Projects Program

## Multidisciplinary: Enrollment by Team/Major





## Essential Characteristics of VIP

- VIP Program Led by Faculty
- Projects Homed in Faculty Research
- Large-Scale Projects Lasting Years/Decades
- Multidisciplinary Teams Encouraged
- Program is Curricular – Identifiable VIP Courses
- Incentives for Students to Participate for 2+ Years
- Classroom and Meeting Space Supporting Teams
- Learning Outcomes Include Development of both Disciplinary and Professional Skills



# Vertically-Integrated Projects Program

## VIP: Benefits to Students

- Realistic Team Experience
- Opportunity to Learn/Master different Roles/Skills
- In-Depth Experience in their Field
- Authentic Multi-Disciplinary Experience
- Knowledge Exchange across many Boundaries
- Provide a Compelling Reason to be on Campus
- Preparation for the Work / Grad School
- Understanding of the Innovation Process
- Fun!



## VIP: Benefits to Universities

- Enhances Student Learning
- Enhances Faculty Research
- Enables New Partnerships
- Creates Multidisciplinary Opportunities
- Compelling Reason to have a Campus
- Everyone Participates in the Innovation
- Deepens/Broadens the University Community





# Vertically-Integrated Projects Program

## The VIP Consortium .... So Far:

- Boise State
- Colorado State
- Florida International
- Georgia Tech
- Howard Univ
- Morehouse College
- National Ilan Univ
- Purdue Univ
- Rice Univ
- Texas A&M Univ
- Univ of Hawaii
- Univ of Michigan
- Univ of Strathclyde
- Univ of Washington
- VA Commonwealth



# Vertically-Integrated Projects Program

## The VIP Consortium .... Additions?

- HBCU ECE Network
- Northeastern Univ
- NYU-Polytechnic
- Ohio State
- Univ. of Delaware
- UC Berkeley
- UC Davis
- ??

## How to Join

- Application Process for Remaining Funded Slot
- Anyone Else Can Join
- We Can All Work on Funding
- Institutionalization is the Goal



## VIP Consortium Characteristics

- All Institutions Field a Faculty-Led VIP Program
- Program Must Have Essential Elements of VIP
- Shared Logo and Branding Effort
- Share Resources/Tools/Processes/etc.
- Everyone Contributes What They Can
- Participate in Evaluation and Dissemination
- Publish Papers and Write Proposals Together
- Work Toward Systemic Reform of Higher Education
- Create VIP Consortium Entity



## The Next Two Days!

- Building Our Network
- Guidance for Starting-Up and Scaling-Up VIP
  - Lessons Learned and Tools Developed
- Adapting VIP to Your Institution
- Setting Your VIP Program's Goals
  - Number of Teams and Students
  - Evaluation
  - Diversity
  - Reporting Requirements
- Our Consortium's Goals and How to Reach Them



# Vertically-Integrated Projects Program

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# Vertically-Integrated Projects Program

What could you do if you had a VIP team?



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