Linking Research, Education, and Professional Skills:

Vertically Integrated Projects (VIP) at Four Institutions

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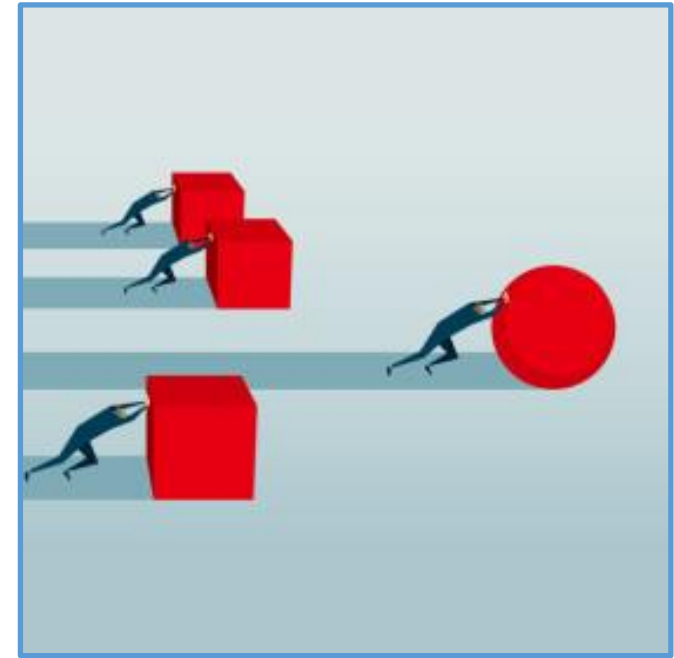
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Goal: Uniting Scholarship & Exploration

Scholarship and Exploration

- Scholarship/Education: Development of Deep Knowledge and Expertise in One or More Fields

- Exploration/Research: Acts of Discovery, Design, Creativity, Innovation, etc. … in One or More Fields

Barriers:
Three Forms of Academic Fragmentation

Fragmentation by Time
Undergraduates' Experiences Confined
to Semesters, Academic Years

Fragmentation By Mission
Academic Staff Activities Partitioned into
Exploration / Scholarship / Outreach

Fragmentation By Discipline
Budget Lines and "Cultures" that
Create and Reinforce Disciplinary Silos

Overcoming Barriers: The VIP Approach

Enable Continuity of Time
For-Credit, Vertically Integrated Projects that Span Students' Time to Degree

Integrate Missions
VIP Teams Embedded in the Research Activities of Academic Staff

Breach Disciplinary Silos
VIP Teams Focus on Ambitious Projects Spanning Multiple Disciplines

VIP Program Architecture:

Enable Long-Term, Large-Scale, Multidisciplinary Teams

- Project teams: Requested by Academic Staff
- Large teams: 10-20+ undergraduates; 1-4 grad students
- *2nd* through *final year* undergraduates on every team
- New students replace those who graduate
- Long-term participation – up to 3 years per student
- Teams continue for many years, even decades
- Students drawn from *all* disciplines needed by the project
- Academic credit and grades each semester
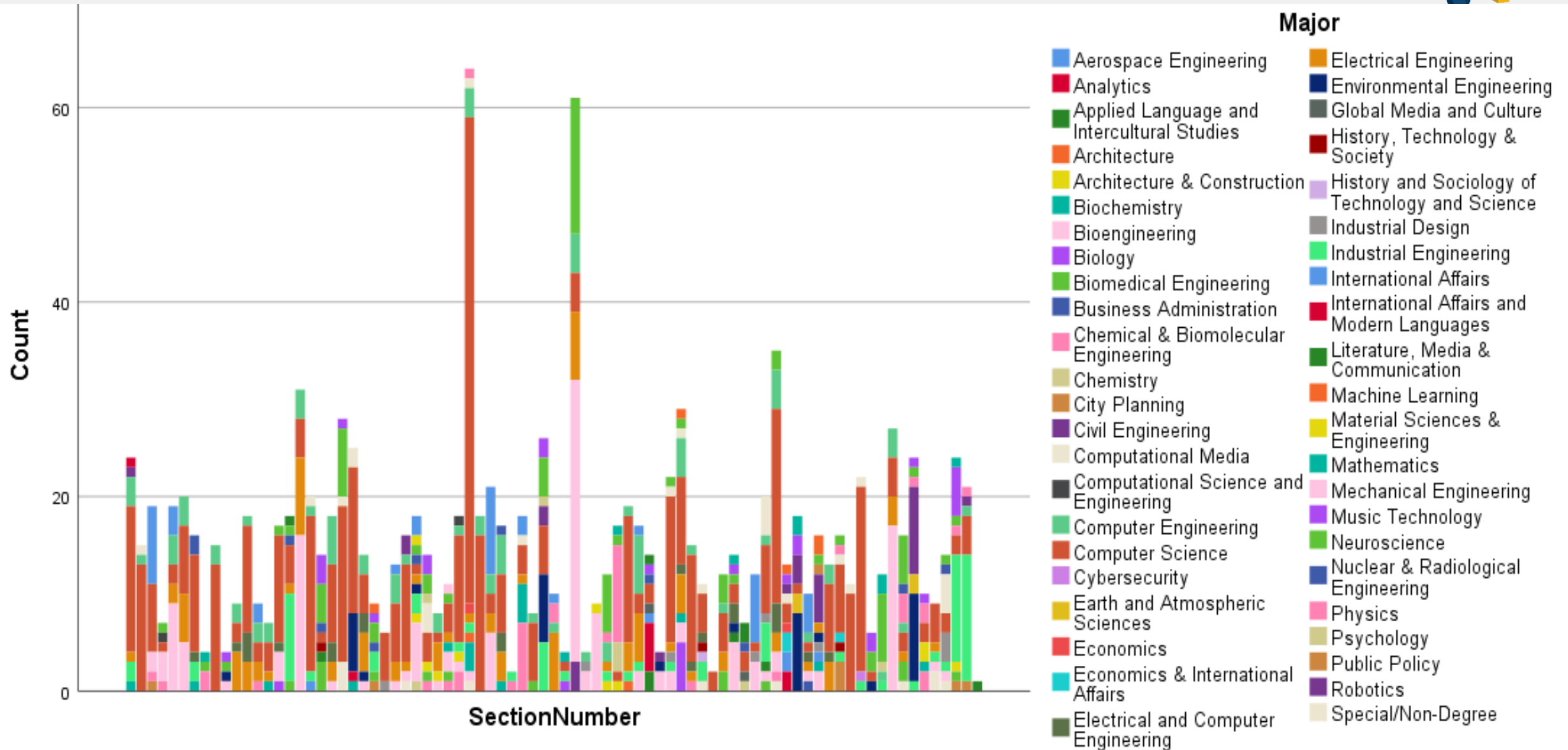
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2015 Members of a 20-year-old VIP Team

Georgia Tech VIP Programme: Spr. 2020

- 81 Teams; 1300 Undergraduates Enrolled

- Students and Academic Staff from *all* GT Colleges: Business, Computing, Design, Engineering, Liberal Arts, and Science

- List of GT VIP teams: Descriptions includes Goals and List of Desired Disciplines:
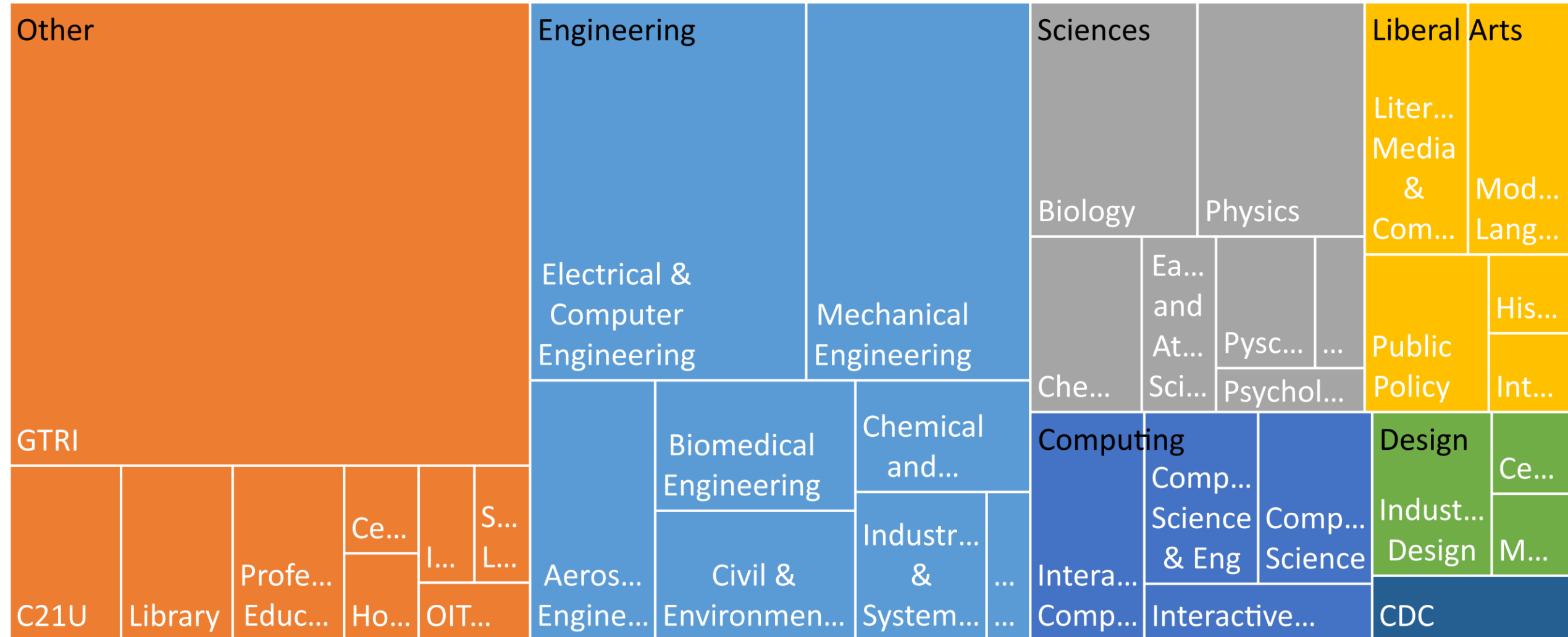
  http://www.vip.gatech.edu/teams

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VIP Team Size & Majors: Spring 2020

Assessing the Performance of VIP Students

- Assessment Process: Middle + End of Each Semester
  - Every Student Graded: A, B, C, D, F
  - No P/F, No Auditing, No Volunteers
- Peer Evaluations – Tuned for VIP's Large Teams
- Three Components in Assessment:
  - <u>Documentation</u>: Journals, Wiki, GitHub, Reports, …
  - <u>Individual Contributions</u>: Judged by Team's Advisers
  - <u>Teamwork</u>: Advisers' Observations plus Peer Evaluations

VIP: Primary Benefits

For Students:
- Long-term Team Experience Focused on a ***Real Project***
- Opportunity to Learn/Master different Roles/Skills
- In-Depth Experience in their Field
- Long-term Multi-Disciplinary Experience

For Academic Staff:
- Better Organized, More Effective UG Research
- Continuity of Knowledge and Experience on Team
- Peer-to-Peer Mentoring and Onboarding by Students

The VIP Programme Characteristics

- Led by Academic Staff
- Projects embedded in Research of Academic Staff
- Large-Scale Projects Lasting Years/Decades
- Multidisciplinary Teams Possible/Encouraged
- Program is Curricular; <u>All</u> Students Graded
- Incentives for Students to Participate for 2+ Years
- Outcomes = Disciplinary + Professional Skills

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The VIP Consortium: 41 Members, So Far….

International (15):
- Inha University (Korea)
- Malmö University (Sweden)
- Natn'l Dong Hwa Univ. (Taiwan)
- Natn'l Ilan University (Taiwan)
- Natn'l Taiwan University (Taiwan)
- Riga Technical University (Latvia)
- Universidad de Chile (Chile)
- Universidad del Norte (Colombia)
- Universidad ICESI (Colombia)
- Universidad Mayor (Chile)
- Univ. of New South Wales (Austral.)
- Univ of Pretoria (South Africa)
- Univ. of St Andrews (Scotland)
- Univ of Strathclyde (Scotland)
- UNICAMP (Brazil)

United States (26):
- Arizona State University
- Boise State University
- Colorado State University
- Cooper Union
- Drexel University
- Georgia State University
- Georgia Tech
- Howard University
- Iowa State University
- Morehouse College
- New York University
- Notre Dame
- Polytechnic Univ. of Puerto Rico
- Purdue University
- Rice University
- Stony Brook University
- Texas A&M University
- UC Davis
- University of Arizona
- University of Delaware
- University of Georgia
- University of Hawaii
- University of Michigan
- University of Washington
- VA Commonwealth University
- Virginia Tech

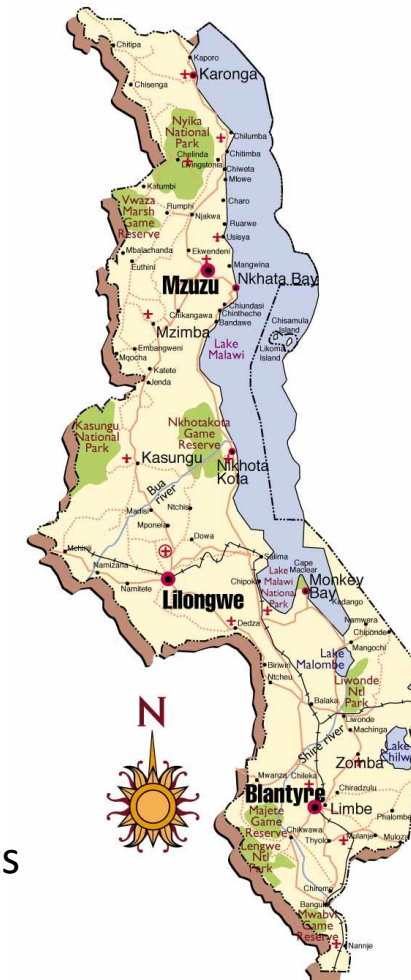# The VIP Consortium: 2019 Annual Meeting

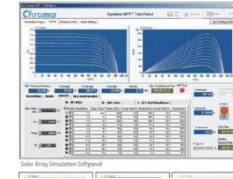# VIP Africa Dimension :
Climate Justice Fund IWRM Research Malawi

The University of Strathclyde Climate Justice Fund: Water Futures Programme aims to be a transformational step supporting the Ministry of Agriculture, Irrigation and Water Development to evaluate rural water supplies in 8 districts in the Lower Shire Malawi (25% of Malawi).

Strathclyde Students Working in Rural Malawi

VIP Consortium

E4D

Tamil Nadu
&
Support The Gambia Solar Project
www.strath.ac.uk/give2gambia

University of
Strathclyde
Engineering

VIP Consortium

VIP4SD currently has:

- 19 multidisciplinary projects operating across all four faculties

- Between 150-200 students per year

- 10 projects conducting outreach, locally and internationally

Green Gown Awards International

aashe
The Association for the Advancement of Sustainability in Higher Education

Project	Lead dept(s)	Disciplines	Years	Status
Energy for Development	EEE	EEE/EME/CES/SBS/CIS	2-4	Established
RoProHand	EEE	EEE/EME/CES/BME/CIS	2-5, PG	New (2019)
RoVER	DMEM	DMEM/EEE/EME/Software Engineering/CIS	2-5, PG	Established
Smart Voice	EEE	EEE/EME/CES/SLT	2-4	New (2019)
WASH	CEE	CEE	PG	Established
Drug Discovery	EEE & SIPBS	EEE/SIPBS/EME/CS/BME	2-5	Established
Smart Grid MVP	EEE	EEE/EME/DMEM/CIS	2-5	New (2019)
Powering Rural Agriculture	EEE	EEE/EME/CES/SBS	2-3	New (2020)
Modern Cooking for All	EEE	EEE/EME/CES/CIS/SBS	2-5	New (2020)
Solar Microgrids for Development	EEE	EEE/EME/CES/CIS	2-5	New (2020)
Satellite Data for Sustainable Development	MAE	MAE	2-5	In development (2021)
Enterprise	SBS	SBS	3	Established
Can Democracy Deliver?	Politics	Politics, Humanities, SBS, Education, Economics	2-5	New (2020)
STEM Education and Public Engagement	Education	Education, Primary Education, Humanities	1-2, 4, PG	Established
TextLab	English & CIS	Humanities (English), CIS	1-4	Established
Inclusive Transitions through Early Years Education and Beyond	Education	Education	2 and 4	New (2020)
Community Engagement and Glasgow Children's University	Education	Education, CIS, Management Science	1, 2 and 4	New (2020)
Hidden Voices	Education	Education	1,2 and 4	New (2020)

Fig. 1. Current VIP4SD projects

Further European VIP sites

- University of Malmö, Sweden
  - Commenced 2018, Cross Faculty
  - 5 Teams, 50 students, Technology, Culture Society

- Riga Technical University, Latvia
  - 7 Teams, 140 students, Technology, Space, Sensors

- University of St. Andrews, Scotland, UK
  - Commenced 2020-21, 8 projects, 60 students
  - First program based mainly in Humanities

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What could you achieve if <u>you</u> had a VIP Team?

VIP Course Structure: Campus-wide Courses Available in all Disciplines

	1 credit	2 credits	3 credits	Paid (0 credits)
2nd Year	VIP 2601			
3rd Year	VIP 3601	VIP 3602	VIP 3603	VIP 3600
4th+ Year	VIP 4601	VIP 4602	VIP 4603 VIP 4983 Final Project	VIP 4600
Graduate	VIP 6601	VIP 6602	VIP 6603	VIP 6600

- Each course can be taken multiple times
- Each *team* is one section of *every* course

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