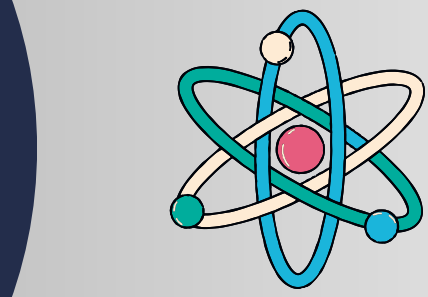
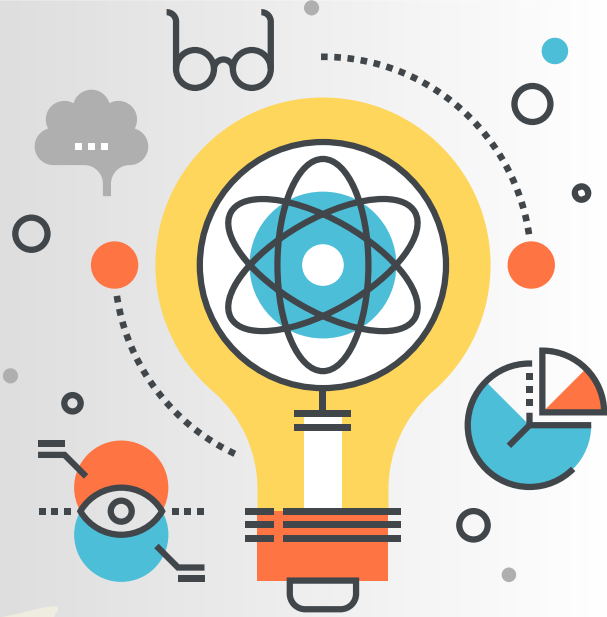

15TH ANNUAL VA-NC ALLIANCE UNDERGRADUATE RESEARCH SYMPOSIUM

Hosted by

National Radio Astronomy Observatory
Piedmont Virginia Community College
University of Virginia

April 3-4, 2024
Charlottesville, VA

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April 3-4, 2024

Greetings!

On behalf of the Virginia–North Carolina Louis Stokes Alliance for Minority Participation (the Alliance, an LSAMP program), I welcome you to Central Virginia for the 15th Annual Undergraduate Research Symposium, co-hosted by the National Radio Astronomy Observatory (NRAO), Piedmont Virginia Community College (PVCC), and the University of Virginia (UVA). The theme of this year's virtual symposium is *Success for All: Fostering Identity and Connections in STEM*.

The Alliance and its eleven partner institutions support undergraduates pursuing science, technology, engineering, and math (STEM) degrees with transition programs, research experiences, presentation opportunities, mentoring, tutoring, professional development workshops, financial support, and more. Through the hard work of its students, faculty, and staff, the Alliance has made significant progress on its enrollment and degree goals since its founding in 2007 with a 145% increase in enrollment and a 166% increase in the number of STEM degrees earned across our partner institutions.

One of the Alliance's key annual activities is this symposium. I appreciate our co-host institutions for bringing us back together for our first in-person Alliance symposium since 2018! I particularly value the leadership of Dr. Melinda Clark and Dr. Nicole Winkler from PVCC, as well as Ms. Danielle Rowland from NRAO, who worked with Ms. Kristin Morgan and Mr. Maurice Walker at UVA to plan this year's symposium and showcase these three partner campuses.

As always, leadership support for the Alliance from partner institutions is essential. I am grateful to Dr. Tony Beasley who directs NRAO, President Jean Runyon who leads PVCC, and President Jim Ryan of UVA for their unwavering support of STEM students. We are honored to have Dr. Beasley deliver the symposium's keynote remarks this year. I also appreciate the important contributions from our presentation moderators, alumni panelists, judges, faculty, and staff who are here to support our undergraduates. Thank you to everyone involved in making the symposium a success.

Students, I wish you all the best with today's presentations and future research – these experiences are crucial as you prepare yourselves for graduate school and future careers. I have learned through my education and career how important it is to seize opportunities like this to network with faculty and peers. Please stay in touch with the Alliance and especially your faculty mentors. We look forward to hearing about your future endeavors!

Best Wishes,

Kevin G. McDonald

Kevin G. McDonald
Vice President for Diversity, Equity, Inclusion, and Community Partnerships
University of Virginia
Principal Investigator, Virginia–North Carolina Alliance

The VA–NC Alliance is funded by a grant from the National Science Foundation.

PIEDMONT VIRGINIA COMMUNITY COLLEGE

OFFICE OF THE PRESIDENT

Symposium Participants:

Welcome to the 15th Annual Virginia–North Carolina Alliance Undergraduate Research Symposium - *Success for All: Fostering Identity and Connections in STEM*. We are pleased to co-host the symposium with the National Radio Astronomy Observatory and the University of Virginia.

Community colleges play an important role in delivering Science, Technology, Engineering, and Math (STEM) education to students at the postsecondary level. According to the Community College Research Center (November 2023), more than 6 million U.S. workers have a community college education and are working in STEM occupations. At Piedmont Virginia Community College (PVCC), we recognize the value of STEM education and embrace the importance of increased diversity and inclusion in STEM participation and programs.

We are grateful to the Alliance and the collective commitment to STEM education. The Alliance has a long history of providing rich research experiences, mentoring, and networking opportunities. In addition, participants shape the future and enrich lives and communities through their research findings. Thank you to the symposium organizers, the Alliance partners, and the participants for making the 15th annual convening possible.

Enjoy your time at PVCC, and best wishes for success.

Sincerely,

Jean M. Runyon, PhD
President

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PVCC Opportunity. Access. Excellence.
PIEDMONT VIRGINIA COMMUNITY COLLEGE

Piedmont Virginia Community College (PVCC) is a nonresidential two-year institution of higher education that serves Central Virginia - principally residents of the City of Charlottesville and the counties of Albemarle, Buckingham, Fluvanna, Greene, Louisa and Nelson. PVCC is one of 23 community colleges in Virginia that comprise the Virginia Community College System (VCCS). The scenic PVCC campus is located in Albemarle County, Virginia. Classes are also offered at the PVCC Eugene Giuseppe Center in Stanardsville (Greene County) and the PVCC Jefferson School Center in downtown Charlottesville.
In addition, PVCC operates two other offices in the downtown Charlottesville area. Thomas Jefferson Adult Career Education (TJACE@PVCC) delivers college and career preparation for adult learners, including English as a Second Language and GED® programs.

Network2Work@PVCC is a job network that connects job seekers to the skills and resources they need to become valued employees and helps employers find the quality employees they need for their companies.

PVCC Workforce Services provides short-term training programs for industry credentials, employee professional development, adult core skills and language acquisition, lifelong learning and youth career exploration. Programming includes open enrollment courses for individuals as well as contract and custom courses for regional businesses and organizations.

PVCC is committed to providing access to a college education for all who can benefit, an opportunity for students to reach their potential, and excellence in all programs and services. PVCC influences both the lives of students and the regional economy. PVCC is the community's college.

Founded in 1819 by Thomas Jefferson, the University of Virginia (UVA) encompasses twelve schools in Charlottesville, as well as the College at Wise in Southwest Virginia. UVA was conceived as a public university designed to advance human knowledge, educate leaders and cultivate an informed citizenry. More than two centuries later, this vision is thriving. Across Grounds - and throughout the world - UVA students, faculty, staff and alumni challenge convention, break barriers and pursue the greater good.

UVA is an iconic public institution of higher education, boasting nationally ranked schools and programs, diverse and distinguished faculty, a major academic medical center and proud history as a renowned research university. The community and culture of the University are enriched by active student self-governance, sustained commitment to the arts and a robust NCAA Division I Athletics program.

UVA offers an affordable, world-class education that is consistently ranked among the nation's best. In 2023, the University was ranked third best public university by U.S. News & World Report. In the 23 years since U.S. News began ranking public universities as a separate category, UVA has ranked in the top four and continues to rank in the Top 30 among the best of all national universities, public and private. The University of Virginia's aim is to be the best public university in 2030, and one of the very best in the world, whether public or private. The way to achieve this goal is by being both great and good.

Founded in 1956, the National Radio Astronomy Observatory (NRAO) enables forefront research into the Universe at radio wavelengths. In partnership with the scientific community, we:

- *provide world leading telescopes, instrumentation, data and expertise;*

- *train the next generation of scientists and engineers;*

- *advance broader, equitable, inclusive participation in science and engineering;*

- *and promote astronomy to foster a more scientifically literate society.*

The NRAO operates three state-of-the-art radio telescope facilities for use by the scientific community, regardless of institutional or national affiliation: (1) the international Atacama Large Millimeter/submillimeter Array (ALMA), (2) the Karl G. Jansky Very Large Array (VLA), and (3) the Very Long Baseline Array (VLBA). The NRAO collaborates with the university astronomy community to develop new instrumentation and technology, and helps train the next generation of scientists through its student, co-op, postdoctoral, and Fellowship programs. NRAO also provides both formal and informal programs in education and public outreach for teachers, students, the general public, and the media.

Symposium Agenda

Pre-Symposium Events		
Date/Time	**Location**	**Event**
Wednesday, April 3 | during the day	UVA	**Inclusive Futures: Belonging in Higher Education and Beyond** Website
Day 1 Events – Piedmont Virginia Community College		
Date/Time	**Location**	**Event**
Wednesday, April 3 | 5:30-6:30 PM	PVCC - Bolick Student Center	**Conference check-in: All**
Wednesday, April 3 | 6:30 PM - 7:00 PM	PVCC - Bolick Student Center	**Welcoming Remarks: Students** **Dr. Jean Runyon** - President of Piedmont Virginia Community College **Engineering Origami Activity: Students** **Dr. Keith Nabb** - Associate Professor of Mathematics Session about origami prototypes used in medicine, robotics, and solar arrays - in addition to a demonstration.
Wednesday, April 3 | 6:30 - 7:00 PM	PVCC - North Mall Meeting Room	**Dinner: Faculty/Staff**
Wednesday, April 3 | 7:00 PM	PVCC - Bolick Student Center	**Group Photo: All**
Wednesday, April 3 | 7:15 PM	PVCC - North Mall Meeting Room	**Welcoming Remarks: Faculty/Staff** **Dr. Jean Runyon** - President of Piedmont Virginia Community College
Wednesday, April 3 | 7:15 PM - 8:30 PM	PVCC - North Mall Meeting Room	**VA–NC Alliance Partner Meeting: Faculty/Staff** For faculty/staff only
Wednesday, April 3 | 7:15-7:30 PM	PVCC - Bolick Student Center	**Dinner: Students** Students retrieve their dinner.
Wednesday, April 3 | 7:30-8:30 PM	PVCC - Bolick Student Center	**Professional Development: Students** **Dr. Anne Allison** - Professor of Biology Session focused on career development, concurrent

Wednesday, April 3 | 8:45 PM		Departure from PVCC to the hotel
Day 2 AM Events – University of Virginia		
Date/Time	**Location**	**Event**
Thursday, April 4 | 9:00-9:30 AM	UVA Ern Commons	**Welcoming Remarks: All** **Dr. Kevin McDonald** - Vice President for Diversity, Equity, Inclusion, and Community Partnerships/Principal Investigator for the VA–NC Alliance **Continental breakfast will be provided.**
Thursday, April 4 | 9:30-10:30 AM	UVA Ern Commons	**VA–NC Alliance Alumni Panel: All** **Panelists:** **Terique Barney**, Research Engineer at NASA Langley Research Center in Hampton, Virginia **Dee McKoy**, PhD candidate in Computational Data Science and Engineering at North Carolina Agriculture and Technical State University **Zoie McMillan**, PhD candidate in the Department of Fish and Wildlife Conservation at Virginia Tech **Moderator:** **Dr. Joshua Epp**, Program Manager for the Men of Color, Honor, and Ambition (M.O.C.H.A.); Women of Color, Honor, and Ambition (W.O.C.H.A.); People of Color, Honor, and Ambition (P.O.C.H.A.)
Thursday, April 4 | 10:30-11:30 AM	UVA labs	**UVA Lab Tours: All**
Thursday, April 4 | 11:30-12:30 PM	UVA Ern Commons	**Keynote and Luncheon: All** **Introduction:** Danielle Rowland, Broadening Participation Programs Manager - National Radio Astronomy Observatory

		Keynote Speaker: Dr. Tony Beasley, Director of the National Radio Astronomy Observatory
Thursday, April 4 | 12:30-1:00 PM	Buses from UVA Ern Commons to NRAO Edgemont	
Day 2 PM Events – National Radio Astronomy Observatory		
Date/Time	**Location**	**Event**
Thursday, April 4 | 1:00-2:30 PM	NRAO Edgemont auditorium, conference rooms, classrooms	**Undergraduate Oral Presentations: All** Presentation Schedule
Thursday, April 4 | 1:15-3:35 PM	NRAO Central Development Lab (CDL)	**Tour and Talk at NRAO CDL: Students** Transition from NRAO Edgemont to NRAO CDL via bus shuttles. Participants will be assigned to 1 of 3 tour groups. Shuttle Departure and Tour Schedule
Thursday, April 4 | 4:00-4:30 PM	NRAO Edgemont auditorium	**Awards Ceremony:** **Dr. Devin Harris**, Professor of Civil (Structural) Engineering and Chair of the Department of Civil and Environmental Engineering at the University of Virginia/Co-Principal Investigator for the VA– NC Alliance **Danielle Rowland**, Broadening Participation Programs Manager - National Radio Astronomy Observatory
Thursday, April 4 | 4:30 PM		Depart for home institution.

Opening Remarks: April 3rd

Jean Runyon joins Piedmont Virginia Community College as the College's sixth president. Prior to accepting the presidency at PVCC, Dr. Runyon was the campus vice president at Front Range Community College's Larimer Campus in Colorado from 2015 - 2022. As the lead executive, Runyon was responsible for leadership of academic and student affairs, corporate and workforce solutions, administration, facilities and campus operations.

From 2007–2015, Dr. Runyon served in progressively responsible leadership positions at Anne Arundel Community College in Maryland. She provided leadership and vision for the creation, continuous planning, and evaluation of online education, learning outcomes assessment, prior learning assessment, institutional professional development, military and veteran initiatives, Weekend College and off-campus programs, Andrew G. Truxal Library, and the Sarbanes Center for Career and Civic Engagement. Runyon was a professor at the College of Southern Maryland from 1985–2007 and the director of the Innovative Teaching Center from 2000–2007.

Runyon completed the Aspen's Rising Presidents Fellowship, a highly selective leadership program preparing the next generation of community college presidents to transform institutions to achieve higher and more equitable levels of student success. She was one of only 40 leaders selected from across the country to participate in the program.

Runyon holds a Doctor of Philosophy in Education in Education Technology Management from Northcentral University, Master of Arts in Education and Human Development from George Washington University and a Bachelor of Science in Education from Bloomsburg University.

Student Professional Development Sessions

Keith Nabb is an Associate Professor of Mathematics at Piedmont Virginia Community College. Dr. Nabb is also the production manager for American Mathematical Association of Two-Year Colleges's peer-reviewed journal, the *MathAMATYC Educator*. He graduated with a bachelor's in Secondary Education (Mathematics) from Rhode Island College, before earning a master's in mathematics from Texas Tech University. Dr. Nabb earned a Ph.D. in Mathematics Education from Illinois Institute of Technology. His research interests are in the teaching and learning of mathematics. Dr. Nabb has always considered himself a teacher first, and a researcher second.

Dr. Anne Allison is a biology professor at Piedmont Virginia Community College. She has a master's and PhD in biochemistry and molecular genetics from the University of Virginia, in addition to a bachelor's degree in biology from Harvard University. Dr. Allison was previously a researcher but transitioned into teaching. She enjoys sharing both the theory and the practice with students. Dr. Allison wants students to see that science affects their lives every day, and that scientific knowledge is refined over time.

Opening Remarks: April 4th

Kevin McDonald is the University of Virginia's Vice President for Diversity, Equity, Inclusion, and Community Partnerships. He joined UVA after serving as the chief diversity officer and vice chancellor for inclusion, diversity, and equity at the University of Missouri System and the University of Missouri – Columbia.

Prior to the University of Missouri System and Flagship campus, McDonald held positions at several other universities, including as vice president and associate provost for diversity, equity, and inclusion at Rochester Institute of Technology, Vice President for equity and inclusion at Virginia Tech, as associate director for compliance and conflict resolution at Johns Hopkins University, and as campus compliance officer at the University of Maryland, College Park. Prior to his work in higher education, McDonald worked for the U.S. Department of Justice and for Network Solutions, Inc. McDonald holds a law degree from The Ohio State University and a doctoral degree in higher education leadership from the University of Rochester. He received his undergraduate degree in psychology from Andrews University in Berrien Springs, Michigan.

VA–NC Alliance Alumni Panel

Moderator

Dr. Joshua Epps is a dedicated individual with a strong motivation to contribute to the well-being and leadership development of others. Currently, Dr. Epps is the Program Manager for Men of Color, Honor, and Ambition; Women of Color, Honor, and Ambition; and People of Color, Honor, and Ambition in the University of Virginia's Division for Diversity, Equity, and Inclusion. His life's passion and purpose revolve around offering comprehensive wellness approaches encompassing physical, spiritual, mental, emotional, social, and occupational dimensions.

With a decade of experience in education, Joshua is committed to assisting others in discovering and actualizing their life's purpose. The University of Virginia's Career Center recognized Dr. Epps with the UVA Career and Student Leadership Award for preparing UVA students to be servant-leaders. Dr. Epps earned his Doctorate of Education in Higher Education from the University of Phoenix.

VA–NC Alliance Alumni Panel

Panelist

Terique Barney joined NASA Langley Research Center in Hampton, VA as an aerospace research engineer in November 2016. Most of his career has been as part of the aeronautics side of NASA where he focused on Airborne Trajectory Management-related research and engineering development. Terique's exploratory activities involved simulating and analyzing what-if scenarios in imagined future airspace systems with in-house prototypes; engaging in live flight tests with these technologies; and incorporating subject pilots from airline partners in human-in-the-loop research studies. Terique has several publications describing simulation, testing and analysis related to his airborne trajectory management work.

Terique most recently supported the Automated Flight and Contingency Management sub-project under the Advanced Air Mobility (AAM) project while functioning in several roles. The most prominent of his roles was that of Principal Investigator for the Flight Path Management batch simulation (FPM-1) and human-in-the-loop (HITL) / batch simulation hybrid (FPM-2) activities, both of which focused on R&D of FPM automation.

Terique has a Bachelor of Science degree in Aerospace Engineering from the University of Virginia (2013) and a master's degree in systems engineering from Old Dominion University (2020). As of spring 2024, Terique provides systems engineering support for the Climate Absolute Radiance and Refractivity Observatory (CLARREO) Pathfinder space science project. Terique began his engineering career training as a Test Director at Aberdeen Test Center for the Department of the Army as part of its ACTEDS program. His interests include R&D for automated aviation operations, airspace operations system analysis, and applying systems engineering rigor to low-to-mid technology readiness level (TRL) aeronautics and space R&D activities.

VA–NC Alliance Alumni Panel

Panelist

Dee Mckoy attended St. Augustine's university and received my B.S. in mathematics. He pursued a Master of Science in applied mathematics at Elizabeth City State University. Dee is currently entering his 4th year as PhD candidate at North Carolina Agriculture and Technical State University with a focus in computer vision and deep learning models. He worked at SAS as a statistical training and technical services intern. Dee has also worked on various projects such as being an e-learning instructor for new course development, testing data migration, and technical blog writing. He likes building deep learning and machine learning models. Dee enjoys the outdoors, and skating is one of his biggest hobbies. He is a firm believer in spending time with family and friends.

VA–NC Alliance Alumni Panel

Panelist

Zoie McMillian is a PhD Student in the Department of Fish and Wildlife Conservation at Virginia Tech, co-advised by Dr. Willandia Chaves and Dr. Elizabeth Hunter. Zoie is interested in incorporating ecological methods and human dimensions of wildlife conservation research to inform wildlife management. Zoie received her bachelor's degree in animal sciences from Virginia Tech in 2020, and her master's degree in animal sciences from University of Maryland College Park in 2022.

The focus of her master's research was assessing methods to increase animal welfare on commercial chicken farms. While conducting animal science research, Zoie became interested in evaluating animal health and working with stakeholders to create collaborative and transdisciplinary approaches to serve animals. Zoie's background in animal welfare and behavior has ultimately led her to a specialized research interest in wildlife species and conservation with a One Health approach.

Zoie's current research at Virginia Tech is centered around identifying potential set points of intervention in the process of illegal collection, trade, and reintroduction of turtles in the United States. She is working to determine the drivers of illegal turtle consumption to inform policy that sustainably combat trade and support conservation efforts. Zoie also plans to incorporate wildlife health surveillance into her research by surveying eastern box turtle (*Terrapene carolina carolina*) populations in Virginia, as disease prevalence plays an important role in informing reintroduction after seizure from illegal trading operations. Interdisciplinary research is a primary focus of Zoie's academic goals at Virginia Tech; she aims to tackle challenging conservation problems that directly involve human behavior.

University of Virginia Lab Tours

University of Virginia (UVA) scientists and engineers are looking forward to giving a tour of their facilities and instruments and talking with Alliance students. There will be three tour groups circulating through three different laboratories. The groups will be led by a UVA student tour leader, departing and returning to Ern Commons. Please check the e-booklet agenda and the Whova app for details and updates! The laboratories include:

Infrastructure Simulation, Sensing and Evaluation Lab

The research within the Infrastructure Simulation, Sensing and Evaluation Lab (I-S2EE) group is interdisciplinary in nature and crosses the boundaries of civil engineering and systems engineering, but has maintained a focus on characterizing the performance and condition state of the built environment using a variety of techniques. I-S2EE research has explored the domains of transportation infrastructure, smart and connected communities, cyber-physical systems, crowd-sourcing, and smart/high-performance materials. URL: engineering.virginia.edu/labs-groups/infrastructure-simulation-sensing-and-evaluation-lab

Kucenas Lab

The long-term goal of research conducted through the Kucenas Lab is to elucidate the roles of peripheral and central glia and glial-glial interactions during nervous system development, maintenance and disease/injury. Using Danio rerio (zebrafish) as a model system (and to a lesser extent, mouse), we combine genetic and pharmacological perturbation, single cell manipulation, RNAsequencing, laser ablation/axotomy, and in vivo, time-lapse imaging to directly and continuously observe glial cell origins, behaviors and interactions in an intact vertebrate. URL: www.kucenaslab.com

Omni-Reality & Cognition Lab

The ORCL is a state-of-the-art virtual reality lab utilizing technology to research human behavior and reaction to virtual environments. Some of the technology in our lab includes high end graphics and processing computers, multiple HTC Vive Pro Wireless headsets, Wahoo Kicr Pro bicycle trainer with haptic feedback devices, physiological wearables and much more! Dr. Donna Chen of the Omni-Reality & Cognition Lab is dedicated to the education and research of human interaction with infrastructure systems and environments, utilizing alternative (virtual, mixed, and augmented) reality technologies. URL: www.engineering.virginia.edu/labs-groups/omni-reality-cognition-lab

UVA ARTS & SCIENCES

UVA ENGINEERING

Keynote Speaker

Anthony J. Beasley is the Director of the National Radio Astronomy Observatory, taking over from Fred K. Lo. After receiving his Doctorate in Astrophysics from the University of Sydney, Beasley joined NRAO as a Postdoctoral Fellow in 1991. He was appointed Deputy Assistant Director in 1997 and then Assistant Director from 1998 to 2000. He left NRAO to become Project Manager for the Combined Array for Research in Millimeter-wave Astronomy (CARMA). In 2004, he returned to NRAO as an Assistant Director, this time as Project Manager for the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile. In 2008, Beasley became the Chief Operating Officer and Project Manager of the National Ecological Observatory Network (NEON). He was appointed NRAO Director in February, 2012.

Keynote Title: Following a Career in Science – Balancing Passion and Reality

Abstract: Our modern society increasingly demands well-trained, highly-organized and computer literate STEM workers from all walks of life to support our day-to-day lives. There are many paths into STEM careers, decisions to be made along the way, and a wide range of outcomes available to students. Young people at the start of their careers are often seeking ways to balance their passions (including all of the sciences represented here) with their basic needs for the future (security, career, resources, location, etc.). In this talk, I will describe some of the science from NRAO over the past thirty years and our plans for the future, and connect how my scientific and broader interests and career journey benefited both me and the Observatory, including key moments, distractions and dead-ends along the way.

Undergraduate Research Presentations

Presentation locations and times are listed on the final page of this section.

Aguayo, David & Reid, Jireh
Presentation Title: ***Design and Development of a Closed-Loop Solar Thermal System***
Presentation Discipline: Engineering
Research Mentor: Dr. Mehran Elahi
Research Institution: Elizabeth City State University
Home Institution: Elizabeth City State University

Abstract: Solar thermal systems convert the infrared radiation from the sun into usable heat. The heat can be used for generating electricity (concentrating solar power), air heating (solar air heating systems), pool heating, and water heating (solar thermal storage systems). Solar thermal storage systems store heat from the sun in water to be used within a building and they fall in two categories: Passive Systems such as integral collector storage (ICS) and thermosyphon and Active Systems such as solar pool heaters, open-loop system, and closed-loop systems. The objective of this project is to design, develop, and install a closed-loop solar thermal system which utilizes flat collectors to gather the sun's radiant energy. This portable system circulates a heat transfer fluid through the collectors and transfers the heat with a heat exchanger. This system will be incorporated into an existing renewable energy laboratory on the campus of Elizabeth City State University (ECSU). Currently, this laboratory is equipped with a roof top PV system. Hands on laboratory modules developed for the thermal system will be included in the laboratory curriculum in support of renewable energy courses offered at ECSU.

Ahmed, Omer
Presentation Title: ***AI Tools vs Debugging Tools: Exploring User Perceptions on Bug Locating Performance***
Presentation Discipline: Computer Science
Research Mentor: Dr. Chris Brown
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: AI advancements have led developers to increasingly rely on tools like ChatGPT for debugging, a process that involves locating bugs within code. This study compares the effectiveness of AI in locating bugs to regular debugging tools by incorporating both approaches into the development process of a debugging tool. We found that debugging tools provide precise control over code but require significant effort and expertise to identify and fix bugs, especially in large programs. AI tools excel in automating the debugging process, providing insights into code behavior, and predicting potential issues.

However, AI tools may not fully comprehend code intent due to a lack of domain-specific knowledge, leading to misleading bug-fix suggestions. As a result, beginning and even experienced programmers prefer to use print statements to debug their code. To address their needs, we are developing a debugging tool that automatically inserts print statements into code in areas where bugs may arise. When the user runs the code, they will be able to track and see if there are any unusual changes to any values in that section of the code. This study highlights the pros and cons of manual debugging and AI tools and introduces a novel approach that attempts to combat these issues. Developers can use this information to make informed decisions when selecting their preferred approach. Insights from this study can guide future research, aiming to enhance these tools for a more efficient and effective debugging process.

Allotey, George
Presentation Title: ***Quantum Entanglement on spatially separated photons***
Presentation Discipline: Engineering
Research Mentor: Dr. Wayne Scales
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: In quantum physics photons are packets of light that are described as individual particles. The interference pattern shows that photons also have a wave-like property meaning that photons have particle-wave duality. Wave-like interference is an important aspect of quantum information engineering and demonstrates the quantum entanglement properties of photons. This is useful for nonlocal interference patterns where two photons separated by a distance can still be entangled and interfere with each other. This is proven through Franson Interferometry which uses two interferometers to look at the interference pattern of entangled photons where some photons go through one interferometer, and the other photons to the other and create three interference patterns. The Bell test measures the entanglement of photons and has an S parameter that describes the strength of entanglement. When S > 2 the photons are entangled and when S < 2 there is no entanglement.

The main purpose of this research is to see whether the interference pattern violates the S parameter throughout the entire wave pattern. The experiment used two Michelson Interferometers to create the interference of the photons, and two polarizers in front of the optical receivers to perform the bell test – in addition to calculating the S parameter. When observing the results at the maximum and minimum of the interference pattern the parameter is S > 2. This was true for each interference pattern of the Franson interferometer. This experiment finds that the interference patterns show entanglement throughout the wave for spatially separated photons, and that entanglement is mostly time dependent.

Barbee, Brianna & Warren, David
Presentation Title: ***Designing, Simulating, and Manufacturing of Two Drones***
Presentation Discipline: Engineering
Research Mentor: Dr. Akbar Eslami
Research Institution: Elizabeth City State University
Home Institution: Elizabeth City State University

Abstract: This undergraduate engineering project outlines the process of designing and building drones. The project introduces students to the conceptual design of drones, the practical application of Computational Fluid Dynamics (CFD) engineering software for fluid simulation, and the integration of mechanical and electrical components to operate the drones. This project serves as a comprehensive learning experience, allowing students to engage in the design, fabrication, and testing of a fully functional drone. The design process starts with utilizing reverse engineering techniques to create a CAD model of the drone, selecting appropriate materials, propulsion systems, and flight controllers. After successfully creating a CAD model, simulating the model with CFD simulation software, and validating the operational capabilities of the drone, a 3D printer is utilized to prototype the different components of the drone. Students also gain hands-on experience assembling the drone from individual components, such as the airframe, motors, propellers, and flight controller. In addition, they learn practical know-how of power distribution systems, wiring, and soldering techniques. The other aspect of the project involves programming the drone's flight controller and onboard systems to communicate hardware with software. Finally, students test the drone to evaluate stability, maneuverability, and payload capacity.

Barron, Jaeden
Presentation Title: ***In vitro analysis of fibrinolytic dissociation of tumor cell clusters***
Presentation Discipline: Engineering
Research Mentor: Dr. Anne-Laure Papa
Research Institution: George Washington University
Home Institution: George Mason University

Abstract: Metastasis occurs when single-cell or multicellular clusters of cancer cells break away from the primary tumor site, and migrate through the bloodstream or lymphatic system to form new tumors in other organs or tissues. Additionally, multicellular clusters have higher metastatic potential than single cells, with fibrin being an integral component in binding, maintaining, and supporting these circulating tumor cell clusters during metastasis. As such, our study aims to evaluate the efficacy of fibrinolytic treatment modalities in dissociating multicellular cancer cell clusters by examining the amount of time needed for the treatment to take effect.

To achieve this, different concentrations of platelet-poor plasma (PPP), containing the fibrin precursor fibrinogen, were incubated with MDA-MB-231-D3H2LN human breast cancer cells, and analyzed via microscopy to construct biologically relevant clusters. Following the development of a model, cells were treated with three different treatment modalities: free tissue plasminogen activator (tPA), modified platelet-based carriers loaded with tPA (tPA-platelet decoys), and saline to assess the difference in dissociation between cancer cell cluster groups incubated with each treatment over time. Our findings show that incubating cancer cells with 10% PPP produces cancer cell clusters with a biologically relevant size. Furthermore, the tPA-platelet decoy treatment significantly dissociated tumor cell clusters after only 7 minutes, whereas the free tPA treatment required 10 minutes of incubation. Following this in vitro analysis, these treatment modalities are currently being tested in vivo to determine their efficacy in delaying metastatic cancer.

Campbell, Jonathan & Rawlings, Frank
Presentation Title: ***Variable Frequency Drive: PLC Motor Control***
Presentation Discipline: Engineering
Research Mentor: Dr. Shu Xiao
Research Institution: Old Dominion University
Home Institution: Old Dominion University

Abstract: This research project intends to control an AC Induction Motor with a Variable Frequency Drive (VFD). The VFD will control the motor by sending varying voltage signals to prompt the motor to operate in different directions and at different speeds. From this control, the voltage and frequency relationship can be graphed. To compensate for the losses within the motor and the load, a tachometer was used as a feedback control signal. The output signal from the tachometer would feedback into our VFD. This would allow us to close the loop on our VFD. Integrated within the VFD is a PID controller that was tuned to stabilize the output speed. Lastly, the Panasonic Programmable Logic Controller (PLC) was integrated into the system to automate the directional and speed control of the motor. This was programmed using ladder logic and structured text for the PLC code. From this research project, a couple real world applications can be modeled.

Carter, Nathanyal
Presentation Title: ***Using Virtual Reality To Do CITI Training***
Presentation Discipline: Engineering
Research Mentor: Dr. Rafael N.C. Patrick
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: Researchers are responsible for conducting exceptional science while protecting participants from physical and psychological harm. To do so successfully, researchers at all levels are required to obtain Institutional Review Board approval for all research activities. Virginia Tech utilizes the Collaborative Institutional Training Initiative (CITI) program to provide educational material and facilitate the management of research-related certifications; however, it is time-consuming and can be disengaging leading to the possibility of reduced knowledge retention and quiz retakes which further exacerbates the problem. This study aims to determine to what extent virtual reality (VR) can improve user experience associated with CITI training; more specifically, the Financial Conflict of Interest certificate.

The study uses a within-subjects design to investigate two levels of CITI training presentation formats (computer-based vs. VR-based) on user experience defined by cognitive workload, knowledge retention, engagement, and comfort. Objective measures of knowledge retention are gathered through post-training quiz results while subjective measures are captured in two forms: cognitive workload using the NASA TLX and engagement and comfort using post-study QuestionPro questionnaires. Additionally, the overall time to completion is measured. Data collection is ongoing; however, results are expected to show a significant difference between presentation formats associated with overall user experience. T-Tests will evaluate the difference between presentation formats for each dependent measure. In sum, VR provides a novel way of completing research training that has the potential for a more efficient, engaging, and enjoyable experience.

Gomez, Yasmeen & Gray, Yhakira
Presentation Title: ***The Cat is In The Bag: An Exploration Into Cat Strollers***
Presentation Discipline: Animal and Poultry Sciences
Research Mentor: Dr. Erica Feuerbacher
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: Feline ownership includes a variety of human-animal interactions, some of which are similar to those involved in dog ownership, but many vary compared to canine ownership. Most notably, this includes the increased connection received through the added duty of walks, which increases physical activity and social interaction between the dog-owner dyad. Cat owners, however, might not see the same benefits of pet ownership as dog owners, particularly in regard to activity levels and social interaction, since it is uncommon to walk a cat. However, with the recent popularity of cat strollers a whole new avenue has opened for cat owners. Consequently, research on cat's behavior in the stroller is nonexistent. One of the concerns, however, of taking a cat in a stroller is how it affects the cat's welfare. This research aims to investigate whether there are any significant behavioral differences between cats that received stroller training and cats that were taken for a stroller ride without any training. Eighty shelter cats from Montgomery County Animal Care and Adoption Center (MCACAC) were assessed, enrolled, and placed into either a training or control group where the training and stroller rides were recorded and later behaviorally coded. Once the research is complete, this will allow us to gather evidence on whether handling shelter cats in this situation will improve their welfare and likelihood of getting adopted. Specifically, we intend to see further research into this field with these findings as it opens a myriad of opportunities.

Hankla, Jacob & Letona, Jonathan
Presentation Title: ***Trends of NO2 in Richmond and Surroundings: Comparison and Contrast of Pre- and Post-COVID Years***
Presentation Discipline: Environmental Sciences
Research Mentor(s): Dr. Lekh Adhikari & Dr. Harishchandra Subedi
Research Institution: Rappahannock Community College
Home Institution(s): Piedmont Virginia Community & Rappahannock Community College

Abstract: This study aims to investigate the effectiveness of investments in public infrastructure and changes in policy to reduce air pollution. We will be collecting data from various satellites and ground-based measurements to examine trends of NO2 levels before, during and post-COVID years. Several metropolitan areas including Richmond, Virginia with differing investments in public infrastructure will be compared. Traffic and population size will be considered to reduce variables. We will be focusing on recent public infrastructure upgrades compared to cities which have not had major improvements to air polluting infrastructure.

Hansen, Gwynyth
Presentation Title: ***Qualitative Analysis of Endophytic Fungi Composition Based on Morphology in Live Leaves versus Dying (Red) Leaves of White Oak and Red Maple***
Presentation Discipline: Biological Sciences
Research Mentor: Dr. Marlena Yost
Research Institution: Piedmont Virginia Community College
Home Institution: Piedmont Virginia Community

Abstract: Endophytes are microscopic organisms that form a symbiotic relationship inside a larger organism. Foliage Endophytic Fungi, fungi living inside leaves, have been found in every living land plant (as of now) and provide many health benefits for their host. Currently, there is no published research on the Endophytic Fungi on central Virginia's native plants. Many of the trees native to Virginia are deciduous; their leaves change colors, die, and abscess from the tree during autumn. The goal of the experiment is to see how the composition of the fungal endophytes changes between a living leaf and a dying leaf prior to abscission.

The hypothesis of this experiment is that there is a difference in the morphological growths cultured between living and dying leaves collected from the same tree at the same time. This was tested by plating surface-sterilized Acer rubrum and Quercus alba leaves on antibiotic-treated PDA. The morphological features of the fungal growths cultured were then categorized to observe potential differences. It was found that the dying leaves had a more diverse array of fungal growths, indicating there was a difference between the composition of fungal endophytes depending on leaf health. It was also found that in the White Oak, there was a significant difference in the number of fungal growths per plate, with the dying leaves having more growths on each plate compared to the living leaves. This supports the hypothesis and is a first look into the fungi that help support our native trees of central Virginia.

Harper, Gabrielle
Presentation Title: ***Association of Self-Reported Stress During Pregnancy and Gestational Age at Birth***
Presentation Discipline: Biological Sciences
Research Mentor: Dr. Jean Kerver
Research Institution: Michigan State University
Home Institution: Bennett College

Abstract: Numerous studies have been conducted to assess associations between stress in mothers during the prenatal period and adverse birth outcomes such as preterm birth. However, findings of these studies have continued to fluctuate making the results inconclusive. The aim was to assess the association between maternal self-reported stress during pregnancy and gestational age at birth by analyzing data from a Michigan perspective pregnancy cohort, hypothesizing that higher stress leads to earlier gestational age at birth. Demographic characteristics including income, highest level of education, race, age, and marital status were described for cohort participants (n=215). Maternal self-reported stress was assessed with the Perceived Stress Scale 4 (PSS-4), a 4-question survey completed during the second prenatal visit. Higher scores are associated with increased levels of stress.

Regression analyses were used to examine the associations between maternal stress and gestational age at birth. Marital status was assessed as a potential confounder. The majority of the sample was either white (n=151) or black (n=39). Education level varied between three groups: high school education or less (n=49), some college including trade (n=64), and associate degree or higher (n=101). Preliminary results show no significant association between self-reported stress and gestational age at birth. Marital status was not included in the regression analysis because it was not associated with higher scores of the PSS-4. This research adds to the body of literature about life stressors and preterm birth and can be used to develop interventions that will help women ensure successful pregnancies and birth outcome.

Klier, Alessandra
Presentation Title: ***Promoting Food Safety and Stability in Value-Added products: Analyzing pH, Water Activity, and Ingredient Contributions for Virginia Food Producers***
Presentation Discipline: Food Science and Technology
Research Mentor: Dr. Melissa Wright
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: Agriculture is Virginia's largest private industry, and this abundance is the basis for the state's thriving food and beverage processing industry. In addition to large food manufacturing companies, Virginia law also allows for the production and sale of value-added food products from home-based operations ("cottage food laws") and commercial kitchens. Starting and sustaining a food business can be challenging for entrepreneurs who may not understand food safety and labeling regulations. Working with large private testing laboratories may require time and money start-ups cannot spare and there is little chance of a personalized experience.

The principal objectives of the Food Producer Technical Assistance Network are to support these food producers in starting their own businesses by assessing food safety through product analysis and creating nutrition facts panels for their products. The safety of food products is often based on the pH and/or water activity, which are the primary analyses performed in the program. It is important to understand how the pH of raw and processed food ingredients affects the intended finished product. To provide producers with accurate nutritional facts for their consumers, panels were generated through inputting recipes into software while accounting for changes caused by processing. Because there is limited information available to support food scientists in this area, a selection of fresh and commercially processed ingredients were analyzed to determine how they contribute to the safety and stability of value-added products.

Maestas, Sophie
Presentation Title: ***Potential of Promession as an Ecologically Beneficial Disposal Method***
Presentation Discipline: Biological Sciences
Research Mentor: Instructor Brianna Cotter
Research Institution: The Meadows School
Home Institution: George Mason University

Abstract: Current methods of disposing of corpses, such as cremation and embalming are harmful to both the environment and human health. Cremation, for instance, is a major contributor to carbon dioxide emissions, releasing 534.6 pounds of CO2 annually, and over 6.8 million metric tons globally. Cremation also releases approximately 600 pounds of vaporized mercury, which can have negative neurodevelopmental effects on children. Embalming fluid, made up of toxic chemicals like formaldehyde and methanol, is harmful to human health and the environment, with an estimated 800,000 gallons of formaldehyde seeping into the ground each year in the U.S.

Promession is a promising alternative to current methods, developed by Swedish scientist Susanne Wiigh-Mäsak. The process involves lyophilizing, or freeze-drying, a corpse, which is then sublimated and buried in a biodegradable container. This method would theoretically remove all harmful factors and have minimal environmental impact. While promession is currently only legal in South Korea, Sweden, and the United Kingdom, positive results from further testing on invertebrates could lead to its legalization and adoption as a more environmentally friendly alternative to traditional burial and cremation methods. If promession were legalized, it could potentially overtake current methods as the most popular corpse disposal option and help mitigate global issues concerning death. Therefore, it is important to continue research and development in more sustainable options like promession, which can reduce carbon emissions and limit the release of harmful chemicals into the environment.

Note: This research began in high school in 2023 and has continued into my college year. It was overseen by Instructor Cotter of the Meadows School in Las Vegas, NV, and was taken to the UNLV Science Fair in the Chemistry category.

Morgan, Gabrielle
Presentation Title: ***Satellite Images Normalization for Flood Detection***
Presentation Discipline: Computer Science
Research Mentor: Dr. Mohamed Elbakary
Research Institution: Elizabeth City State University
Home Institution: Elizabeth City State University

Abstract: The purpose of this project is to code and create a method for flood detection of satellite images, using learned image processing and remote sensing techniques. Once a rough-draft code has been created, the goal is to improve upon it. This improvement can later be measured by accuracy (quantitatively), visible results (qualitatively), and even computational cost. The results shown are for normalization, a preprocessing step for flood detection.

Rogers, Asia
Presentation Title: ***Impact of Race and Sensitive Personalities on Insomnia in Collegiate Athletes***
Presentation Discipline: Biological Sciences
Research Mentor: Dr. Nicole Hoffman
Research Institution: Michigan State University
Home Institution: Bennett College

Abstract: Insomnia is defined as difficulties initiating or maintaining sleep and early awakening before achieving optimum sleep. A highly sensitive person is someone who has a low tolerance for stimuli, a characteristic exemplified as sensory processing sensitivity. Levels of sensitivity are not fully understood in collegiate athletes, especially in individuals based on race. College athletes, particularly those from racial minority backgrounds, may suffer from these traits due to the number of environmental stimuli they encounter within their sport. Consequently, their demanding schedules can potentially negatively impact their sleep, especially if they are highly sensitive.

The purpose of this study was to determine whether race and the degree of hypersensitivity predict whether collegiate athletes will have an insomnia disorder. We performed a cross-sectional study of Division I collegiate athletes (age: 19.8±1.7 yrs; divided into 2 groups: racial minority and white) from Michigan State University. Participants (n=377) were asked to complete a 5-10-minute survey, administered via Qualtrics, which included demographics and two self-reported questionnaires: Highly Sensitive Person (HSP) and Pittsburgh Sleep Symptom Questionnaire – Insomnia (PSSQ_I). The HSP examines a person's sensitivity to environmental stimuli and their awareness of the subtleties of the world around them. The PSSQ_I examines participants' sleep symptoms during the past month and looks for insomnia characteristics. Our findings indicated that collegiate athletes who were racial minorities with higher degrees of sensitivity had greater odds of experiencing an insomnia disorder compared to white collegiate athletes. Future research should explore causes of the racial disparity in collegiate athletes with higher levels of sensitivity and their relationship with insomnia.

Rojas Burgos, Arlenis
Presentation Title: ***Design and Development of a Data Acquisition Software***
Presentation Discipline: Computer Science
Research Mentor: Dr. Kerry Krauss
Research Institution: Elizabeth City State University
Home Institution: Elizabeth City State University

Abstract: Data acquisition is the process of sampling signals from a physical phenomenon and converting them into a digital format. A data acquisition system typically includes sensors, signal-measuring devices, software for data collection, and hardware for data storage, such as a computer. The goal of this project is to design and develop a modular program for real-time measurement, data logging, and process monitoring using a graphical programming platform. This interactive software is to read, collect, and store time-stamped data from as many as ten nanotechnology-based sensors detecting various volatile organic compounds. The data acquisition includes a 10-channel scanner card, an electrometer/high resistance meter designed to measure very small voltages and currents, and an IEEE 488.2 USB-to-GPIB interface adapter. Time-stamped data is stored and displayed in real-time graphics, providing process monitoring and subsequent post-data processing. This modular program will be used both for research and classroom setting in support of a hands-on laboratory curriculum.

Santiago, Francisco
Presentation Title: ***Understanding Socially Anxious Individuals' Interactions using Indicators of Social Dynamics***
Presentation Discipline: Computer Science
Research Mentor: Dr. Laura Barnes
Research Institution: University of Virginia
Home Institution: Johnson C. Smith University

Abstract: Social anxiety is a common mental disorder that causes those who suffer from it to retreat from social interaction on a regular basis. It takes years for individuals who suffer from this disorder to seek help. Even then, due to a combination of variables, individuals have their treatment hampered making it a long endeavor. An understanding of social dynamics, such as the structure of individual interactions within a social context, could potentially illuminate the patterns that indicate anxiety. The study by the Link Lab team analyzed conversations involving individuals who identify as socially anxious. This program was originally meant for analyzing dyadic conversations between a patient and medical provider, but it can be applied to other dyadic conversations. The participants engaged in two different dyadic experiences, one where they are told that after conversing, they were going to be evaluated, and the other they were not going to be evaluated. The conversations were conducted and recorded in Zoom and then transcribed via Otter.ai. Acoustic analysis was conducted by algorithms within Python to extract features of social dynamics, these being interruptions, pauses, and turn-taking; this is done to measure qualities in the conversation like dominance. The hope for this project is to help create ways to reduce anxiety in individuals.

Smith, Analis
Presentation Title: ***Assessing T4 Phage AC Gene Function in Relation to Bacterial Lysis***
Presentation Discipline: Biological Sciences
Research Mentor: Dr. Bryan Hsu
Research Institution: Virginia Tech
Home Institution: Virginia Tech

Abstract: Low levels of acridine compounds, such as acriflavine hydrochloride, have demonstrated a propensity to inhibit bacteriophage propagation while allowing their bacterial counterparts to survive (1). Previous research has identified a currently unelucidated gene within related T-even phages, the acriflavine resistance gene (ac gene), connected to the uptake of acriflavine during phage infection (2). This results in phage resistance to acriflavine when the gene is mutated or knocked down, permitting phage propagation. Interestingly, preliminary data also suggests a connection between the ac gene and phage lysis. Within this study, we developed a construct for an ac gene knockout in T4 phage and studied the effect on phage infection and propagation. Our results demonstrate that interruptions in the ac gene cause an increase in lysis of bacterial cells during phage infection compared to wildtype T4 phage, with the largest differences resulting from differing nutrient compositions. These methods are fundamental in understanding potential functions to the ac gene and its implications in the regulation of phage lysis.

Presentation Schedule and Room Assignments

Location: NRAO Auditorium

Presenter(s)	Institution Affiliation	Presentation Discipline	Time
Allotey, George	Virginia Tech	Engineering	1:00 – 1:15 PM
Barbee, Brianna & Warren, David	Elizabeth City State University	Engineering	1:15 – 1:30 PM
Barron, Jaeden	George Mason University	Engineering	1:30 – 1:45 PM
Campbell, Jonathan & Rawlings, Frank	Old Dominion University	Engineering	1:45 – 2:00 PM
Carter, Nathanyal	Virginia Tech	Engineering	2:00 – 2:15 PM

Location: NRAO Room 209

Presenter(s)	Institution Affiliation(s)	Presentation Discipline	Time
Hankla, Jacob & Letona Jonathan	Rappahannock Community College & Piedmont Virginia Community College	Environmental Sciences	1:00 – 1:15 PM
Klier, Alessandra	Virginia Tech	Food Science and Technology	1:15 – 1:30 PM
Santiago, Francisco	Johnson C. Smith University	Computer Science	1:30 – 1:45 PM
Ahmed, Omer	Virginia Tech	Computer Science	1:45 – 2:00 PM
Morgan, Gabrielle	Elizabeth City State University	Computer Science	2:00 – 2:15 PM
Rojas Burgos, Arlenis	Elizabeth City State University	Computer Science	2:15 – 2:30 PM

Location: NRAO 230

Presenter(s)	Institution Affiliation	Presentation Discipline	Time
Gomez, Yasmeen & Gray, Yhakira	Virginia Tech	Biological Sciences	1:00 - 1:15 PM
Hansen, Gwynyth	Piedmont Virginia Community College	Biological Sciences	1:15 - 1:30 PM
Harper, Gabrielle	Bennett College	Biological Sciences	1:30 - 1:45 PM
Maestas, Sophie	George Mason University	Biological Sciences	1:45 - 2:00 PM
Rogers, Asia	Bennett College	Biological Sciences	2:00 - 2:15 PM
Smith, Analis	Virginia Tech	Biological Sciences	2:15 - 2:30 PM

NRAO Central Development Lab Tours

CDL Tours:

CDL scientists and engineers are looking forward to giving a tour of their facilities and instruments and talking with Alliance symposium participants. There will be three tour groups of up to 15 individuals each, leaving the NRAO Edgemont Rd. Facility by bus to the CDL. Please check the e-booklet agenda and the Whova app for details and updates!

1. Mixers lab

The ALMA receivers are based on superconducting devices called SIS junctions (superconductor-insulator-superconductor.) They only operate at cryogenic temperatures around 4 Kelvin (-270 Celcius, -453 Fahrenheit.) In this lab we test the devices to determine whether they meet specifications, and their optimal operating parameters. Also in this lab is an ALMA band 6 cartridge test system which tests the whole integrated receiver. Displays will be an ALMA band 6 receiver, a mixer chip mounted in a block, a mixer test system, a cartridge test system, and some other device test stations.

2. Chemistry lab

Many components in the receivers are electro-plated, electro-formed, or both. This lab is where that work takes place.

3. Machine shop

Most components are also machined. The most critical components have very tiny features requiring high precision.

4. Front End Integration Center

This lab is where the ALMA front ends were integrated and tested. A working 10-band ALMA receiver and the test station for it will be shown. There will also be a poster showing how some of the precision reference signals for ALMA are distributed.

5. Local Oscillator (LO) lab

The receivers require highly stable reference signals in the same frequency range as the sky signals we are observing. The LO electronics provide those. Displays will be some of the electronic assemblies involved, including one under a microscope.

CDL URL: https://science.nrao.edu/facilities/cdl

Awards Ceremony

Co-emcees

Dr. Devin Harris is a Professor of Civil (Structural) Engineering and Chair of the Department of Civil and Environmental Engineering at the University of Virginia (UVA). He is also a member of UVA's cyber-physical systems collaborative research lab, the Link Lab. Dr. Harris received his Ph.D. and M.S. in Civil Engineering (Structural) from Virginia Polytechnic Institute and State University in 2007 and 2004, respectively and his B.S. in Civil Engineering from the University of Florida in 1999. His research interests focus on large scale civil infrastructure systems with an emphasis on smart cities. Most recently the work within his research group, the Infrastructure Simulation, Sensing and Evaluation (I-S2EE) Laboratory, has explored new strategies for assessment large scale infrastructure systems built around the framework of digital twins. This work seeks to leverage artificial intelligence coupled with image-based evaluation and simulation techniques to guide performance-based decision-making of existing infrastructure systems.

Danielle Rowland (she/her) is a Broadening Participation Program Manager at the National Radio Astronomy Observatory (NRAO). She has a B.A. in Astrophysics from Columbia University and an A.A. in General Studies from New York University. Danielle is an enrolled member of the Tonawanda Seneca Nation, Snipe Clan. At NRAO she manages multiple student programs operated by the Office of Diversity and Inclusion and the student facing aspects of various observatory projects. Danielle has a 7+ year background in astronomy research, educational outreach, and equity and inclusion efforts.

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MAIN CAMPUS BUILDINGS AND PARKING

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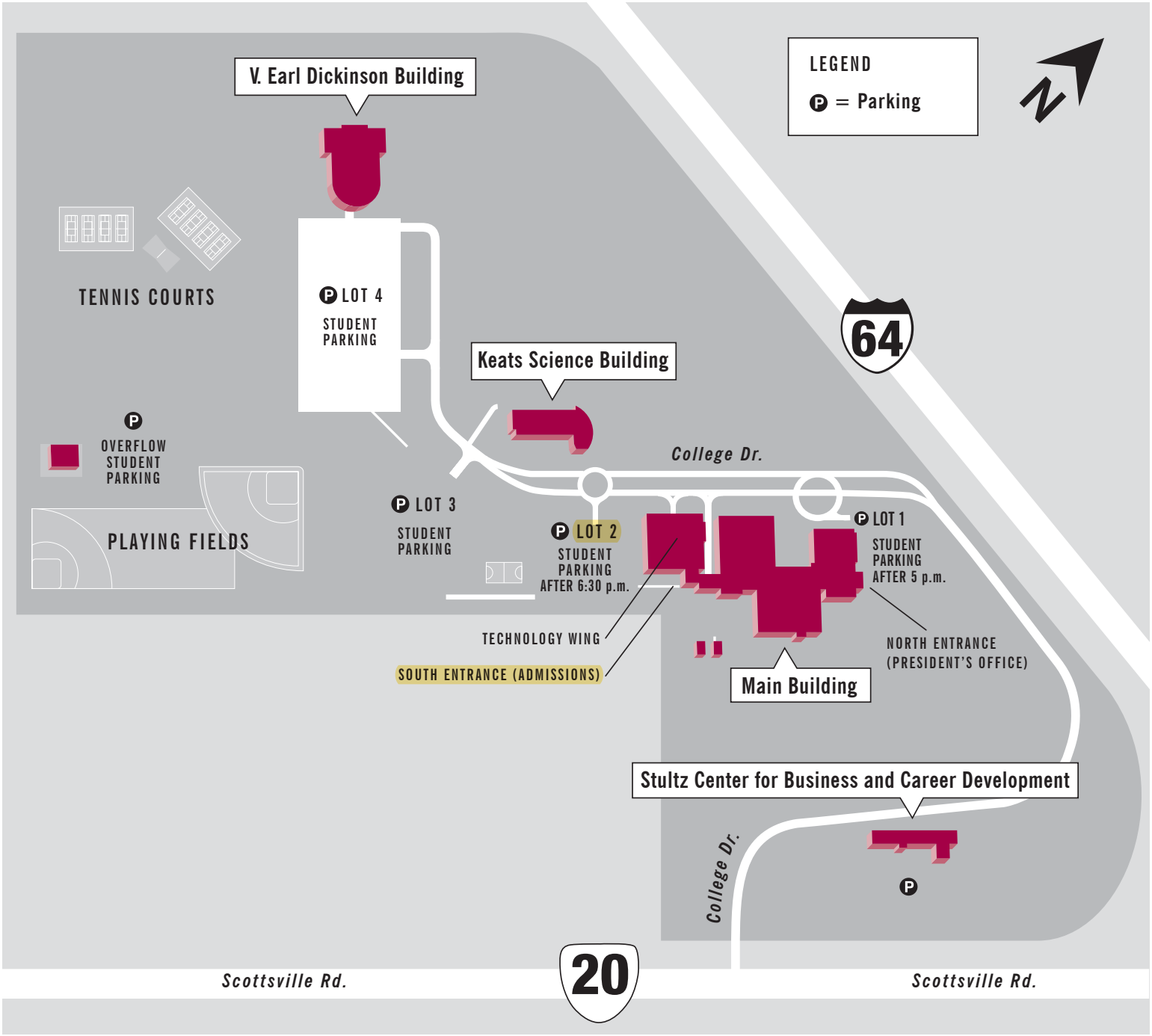
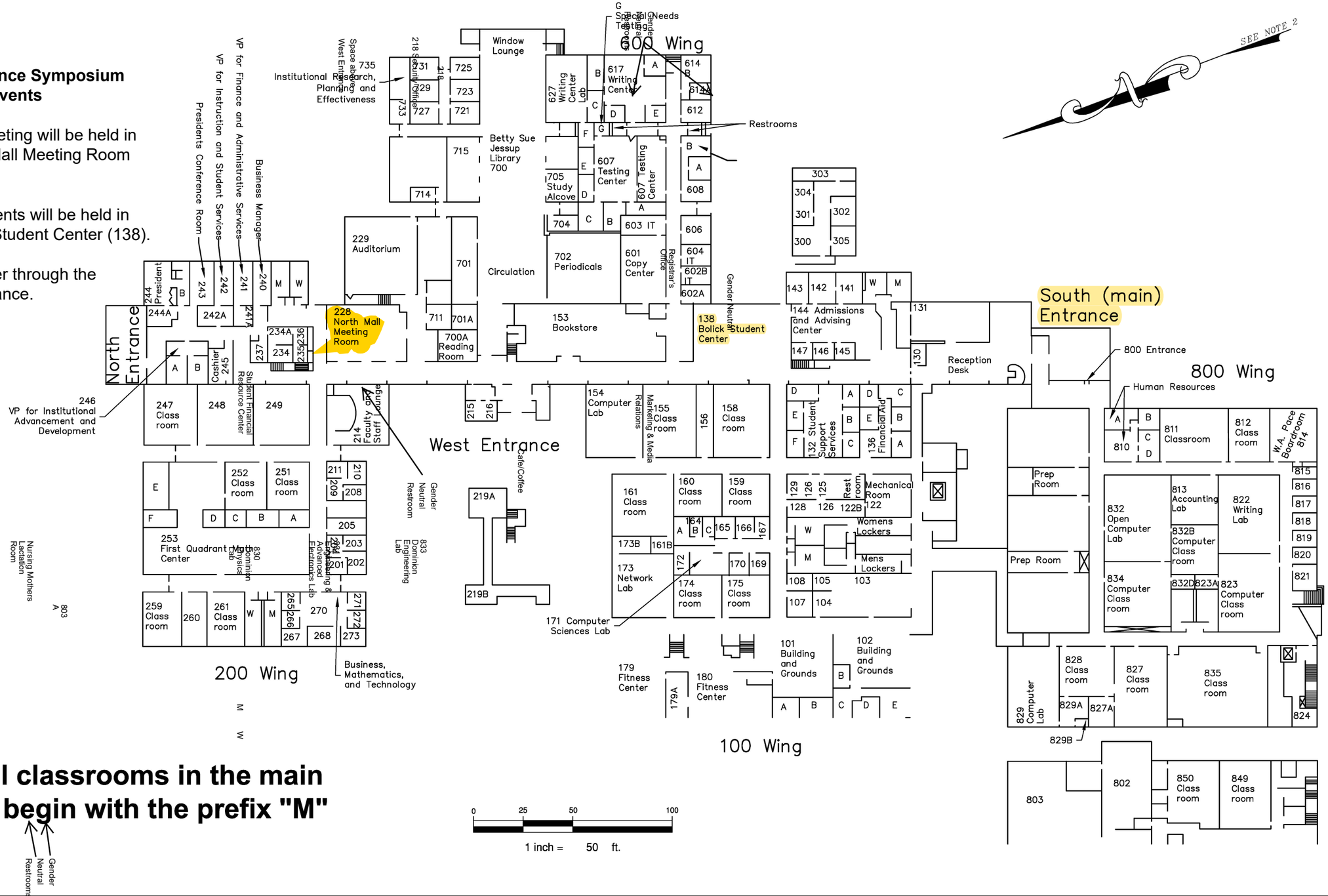
www.pvcc.edu

Park in parking lot #2, in visitor spaces or non-reserved parking spaces. Please avoid parking in reserved spots. Please enter through "South Entrance" (Admissions).



VA-NC Alliance Symposium Events

- Partner meeting will be held in the North Mall Meeting Room (228).
- Student events will be held in the Bolick Student Center (138).
- Please enter through the South Entrance.



Note: All classrooms in the main building begin with the prefix "M"

Gender Neutral Restrooms

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MAIN BUILDING FLOOR PLAN

PIEDMONT VA COMMUNITY COLLEGE, CHARLOTTESVILLE, VA

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434-295-0700 Fax: 434-295-2105
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Richmond, VA
Hampton Roads, VA

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Academic, Administrative and Student Life

1	D5	102 Cresap Road	
2	D5	108 Cresap Road	
3	F6	1515 University Avenue	
4	C3	2200 Old Ivy Road	
5	B3	2400 Old Ivy Road	
6	A2	2476 Old Ivy Road	
7	B3	310 Old Ivy Way	
8	C3	315 Old Ivy Way	
9	A5	Aerospace Research Laboratory	
10	C7	Albert H Small Building	
11	A6	Alden House (Observatory House 1)	
12	E6	Alderman Library	
13	D5	Alumni Hall	
14	E7	Amphitheater	
15	E3	Arlington Blvd 1910	
16	C6	Astronomy Building	
17	D6	Bavaro Hall (Curry School of Education)	
18	E5	Bayly Building (The Fralin Museum of Art)	
19	D5	Bemiss House (University Press)	
20	C6	Biology Greenhouse	
21	F6	Booker House (Provost's Office)	
22	F6	Brooks Hall	
23	E7	Bryan Hall	
24	C7	Bryant Hall at Scott Stadium	
25	E5	Campbell Hall (School of Architecture)	
26	E5	Carr's Hill (President's House)	
27	F2	Carruthers Hall	
28	D7	Chemical Engineering Research	
29	C7	Chemistry Building	
30	E2	Child Care Center	
31	D7	Clark Hall	
32	E6	Clemons Library	
33	E7	Cocke Hall	
34	B8	Colony Plaza/2205 Fontaine Ave	
35	D1	Darden School of Business	
	A	Abbott Center	
	B	Classroom Building	
	C	Darden Library	
	D	Faculty Building	
	E	Saunders Hall	
	F	Sponsors Hall East	
	G	Sponsors Hall West	
36	E7	Dawson's Row	
	A	Dawson's Row #1	
	B	Dawson's Row #2	
	C	Dawson's Row #3	
	D	Dawson's Row #4	
37	D6	Dell Building #1	
38	D6	Dell Building #2	
39	E5	Drama Building (Culbreth and Helms Theaters)	
40	E5	Drama Ed. Bldg. Addition (Ruth Caplin Theatre)	
41	D4	Dynamics Bldg (2015 Ivy Road)	
42	C2	Faulkner House (Miller Center of Public Affairs)	
43	E5	Fayerweather Hall	
44	A5	Fluids Research Laboratory	
45	A2	Fontana Food Center	
46	E6	Garrett Hall	
47	E7	Gibson Hall	
48	C6	Gilmer Hall	
49	D7	Halsey Hall	
50	E6	Harrison Inst. & Small Special Collections Library	
51	B6	High Energy Physics Lab	
52	E6	Hotel D	
53	E6	Hotel E	
		(Colonnade Hotel/Garden Room/West Range Cafe)	
54	F5	Hunter Smith Band Building	
55	B2	Ivy Stacks	
56	E6	Jefferson Hall (Hotel C)	
57	B2	Jefferson Quarry	
58	B8	Jefferson Scholars Foundation	
59	E1	Judge Advocate General's School (TJAGLCS)	
60	D7	Kerchof Hall	
61	B6	Lacy Hall	
62	E5	Lady Astor Pavilion	
63	D6	Lambeth House	
64	D1	Law School (David A. Harrison III Law Grounds)	
	A	Clay Hall	
	B	Hunton And Williams Hall	
	C	Slaughter Hall	
	D	Student-Faculty Center	
	E	Withers-Brown Hall	
65	C6	Leake Building (Facilities Management)	
66	E7	Levering Hall (Hotel F)	
67	F4	Loma Sundberg International Center	
68	F6	Madison Hall (President's Office)	
69	F5	Madison House	
70	D7	Materials Science	
71	E7	Maury Hall	
72	A6	McCormick Observatory	
73	D7	Mechanical Engineering	
74	F6	Memorial to Enslaved Laborers	
75	F2	Michie North (918 Emmet Street)	
76	F2	Michie South (914 Emmet Street)	
77	E2	Millmont Cottage (1023 Millmont St)	
78	E2	Millmont Building (1023 Millmont St)	
79	E6	Minor Hall	
80	E6	Monroe Hall	
81	C2	Montesano (2333 Old Ivy Rd)	
82	E7	Nau Hall	
83	E7	New Cabell Hall	
84	E6	Newcomb Hall (Student Center)	
85	C6	Observatory Hill Dining	
86	A6	Observatory Mtn Engineering Research Facility	
87	E7	Old Cabell Hall	
88	B2	Old Ivy Road Office Building	
89	D7	Olsson Hall	
90	F5	O'Neil Hall	
91	F2	Parking & Transportation	
92	E6	Pavilion VII/Colonnade Club	
93	E6	Peabody Hall (Undergraduate Admission Office)	
94	F5	Peyton House	
95	F5	Peyton House Modular Office	
96	C7	Physical And Life Sciences Building	
97	D6	Physics/Jesse Beams Laboratory	
98	A2	Printing Service Center	
99	A2	Printing Service Center Addition	
100	E7	Randall Hall	
101	D7	Rice Hall	
102	E7	Robertson Hall (McIntire School of Commerce)	
103	E6	Rotunda	
104	E7	Rouss Hall (McIntire School of Commerce)	
105	E5	Ruffin Hall (Studio Arts)	
106	D6	Ruffner Hall (Curry School of Education)	
107	B8	Runk Dining Hall	
108	B5	Shelburne Hall (VA Transportation Res. Council)	
109	B6	Skipwith Hall	
110	E7	South Lawn Commons	
111	B6	Spec Material Handling/Env Health & Safety	
112	B5	Stone Hall (National Radio Astronomy Observatory)	
113	B6	Stores Warehouse (Recycling Office)	
114	B7	Student Activities Building	
115	D7	Thornton Hall	
116	E6	University Chapel	
117	B6	University Press Warehouse	
118	A3	University Visitor Center / University Police	
119	E7	Varsity Hall	
120	F6	Washington Hall (Hotel B)	
121	F4	Watson Manor	
122	D7	Wilsdorf Hall	
123	E7	Wilson Hall	
124	B3	WTJU Offices	
125	B5	Zehmer Hall (School of Continuing & Prof Studies)	

Parking Garages

126	G7	11th Street Parking Garage
127	E3	Arena Parking Garage
128	D6	Bookstore/Central Grounds Parking
129	E5	Culbreth Road Garage
130	D1	Darden Parking Garage
131	G7	East Parking Garage
132	E4	Emmet/Ivy Garage
133	F8	Nursing School Garage (under McLeod Hall)
134	B2	Old Ivy Parking Structure
135	E8	South Parking Garage
136	C7	Stadium Parking Garage
137	C8	West Scott Stadium Parking

Health System

138	G7	1003 West Main Street	
139	G7	1107 West Main Street	
140	G7	1200 West Main Street	
141	G8	999 Grove Street (Lee Building)	
142	G7	Battle Building	
143	F7	Claude Moore Health Sciences Library	
144	F7	Claude Moore Medical Education Building	
145	E7	Claude Moore Nursing Education Building	
146	E7	Cobb Hall	
147	F7	Corner Building	1
148	F7	Education Resource Center	
149	E7	Elson Student Health Center	
150	F7	Emergency Department	
151	F7	Emily Couric Clinical Cancer Center	
152	F7	Hospital Link	
153	F6	Hospitality House Blue Cottage	
154	F7	Jefferson Park Medical Office Building	
155	A3	KCRC Commonwealth Court	
156	H8	Malcolm W Cole Child Care Center	
157	F7	McKim Hall	
158	F7	McLeod Hall	
159	F8	Medical Research Buildings	•
	A	Biomed. Eng. & Medical Sci. Bld. (MR-5)	
	B	Carter-Harrison Research Bldg (MR-6)	
	C	Medical Research Lab (MR-4)	
160	F7	Medical School Bldg	
161	F7	Pinn Hall	
162	F7	Primary Care Center	
163	F7	Primary Care Center Annex	
164	G7	Stacey Hall	
165	F7	University Hospital	
166	G7	UVA Clinical Laboratory	
167	G7	UVA Community Credit Union (1018 W Main)	2
168	E8	UVA Outpatient Surgery Center	
169	F7	West Complex	

Athletic/Recreational Facilities

170	C7	Aquatic & Fitness Center
171	D4	Athletic Village
172	E5	Carr's Hill Field
173	E5	Carr's Hill Field Support Facility
174	D1	Copeley Field
175	D6	Dell (Perry-Fishburne) Tennis Courts
176	D6	Dell Basketball Courts
177	C3	Disharoon Park
178	E3	Frank C. McCue III Center
179	E4	George Welsh Indoor Practice Facility
180	E3	John Paul Jones Arena
181	D3	Klockner Stadium
182	F5	Lambeth Field
183	D3	Lannigan Field
184	F5	Madison Bowl
185	E5	Memorial Gymnasium
186	E6	Nameless Field
187	D2	North Grounds Recreation Center
188	F1	The Park
189	C7	Scott Stadium at Carl Smith Center
190	E5	Sheridan Snyder Tennis Center
191	B6	Slaughter Recreation Center
192	E1	The Park - Indoor Field #7
193	D4	University Hall Turf Field
194	F1	Varsity Softball Facility

Residential Buildings

195	B7	Alderman Road Residence Area	
	A	Balz-Dobie House	
	B	Cauthen House	
	C	Courtenay House	
	D	Dunglison House	
	E	Ern Commons	
	F	Gibbons House/Housing & Residence Life	
	G	Fitzhugh House	
	H	Kellogg House	
	I	Lile-Maupin House	
	J	Shannon House	
	K	Tuttle-Dunnington House	
	L	Watson-Webb House	
	M	Woody House	
196	E8	Bice House	4
197	E8	Bond House	
198	D6	Brown College at Monroe Hill	
	A	Davis House	
	B	Gildersleeve House	
	C	Harrison House	
	D	Holmes House	
	E	Long House	
	F	Mallet House	
	G	McGuffey House	
	H	Peters House	
	I	Rogers House	
	J	Smith House	
	K	Tucker House	
	L	Venable House	
199	D2	Copeley Hill Residence Area	
200	D2	Faulkner Complex	
	A	Hench Apts	
	B	Mitchell Apts	
	C	Younger Apts	
201	B7	Hereford Residential College	
	A	Johnson House	
	B	Malone House	5
	C	Norris House	
	D	Vaughan House	
	E	Weedon House	
	F	Whyburn House	
202	D5	International Residential College	
	A	Hoxton House	
	B	Lewis Apts	
	C	Mary Munford House	
	D	Roberta Gwathmey House	
203	E4	Lambeth Field Residence Area	
204	D6	McCormick Road Residence Area	
	A	Bonnycastle House	
	B	Dabney House	
	C	Echols House	
	D	Emmet House	
	E	Hancock House	
	F	Humphreys House	
	G	Kent House	6
	H	Lefevre House	
	I	Metcalf House	
	J	Page House	
205	B7	Stadium Road Residence Area	
	A	Dillard Houses	
	B	Gooch Houses	

Language Houses

206	E7	Barringer Mansion/French House
207	E7	Casa Bolivar/Spanish House
208	E7	Shea House

Faculty/Staff Housing

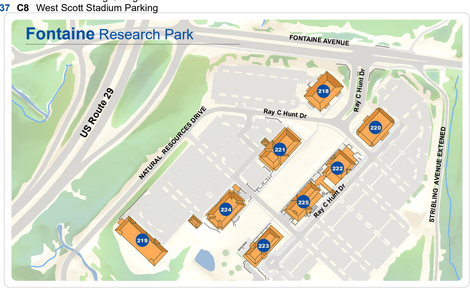
209	C2	Faulkner Residences
210	D6	Monroe Hill House/Range
211	D7	Montebello
212	D5	Morea House
213	A8	Piedmont Faculty Housing
214	D5	Sprigg Lane House
215	A7	Vyssotsky Cottage (Observatory House 2)

Family Housing

216	D2	Copeley Hill Apartments
217	E3	University Gardens

Fontaine Research Park

218	I	400 Ray C. Hunt Drive
219	N	Aurbach Medical Research Bldg (450)
220	S	CFA Institute Building (560)
221	E	Fontaine Medical Office Building 1 (415)
222	T	Fontaine Medical Office Building 2 (545)
223		Health Services Foundation (500)
224		Sheridan G. Snyder Translational Research Bldg (480)
225		UVA HealthSouth Rehab Hospital (515)



Law School
Darden School
Leonard Sandridge Road
Darden Gatehouse
Parking & Transportation
US Route 29 Charlottesville Airport
Faulconer Drive
US 29 / US 250 Bypass
Northridge Medical Park
Mosaic Radiation Therapy Center
UVA Transitional Care Hospital
Birdwood Country Club
Millmont Street
Arlington Blvd
Emmet St
Barracks Road
Carruthers Hall
Human Resources
Crestwood Drive
University Visitor Center
University Police
Massie Road
Davenport Field
Copeley Road
Ticket Booth
John Paul Jones Arena
Ivy Road
Colonnade Drive
Hereford Drive
Alderman Road
Stadium Road
Scott Stadium
Maury Avenue
Fontaine Avenue
Fontaine Research Park
US Route 29
Interstate 64
Zehmer Hall/ Conference Center
Edgemont Road
McCormick Road
University Cemetery
The Dell
Central Grounds Garage
UVA Bookstore
Rotunda
The Lawn
4th Street
10th Street
Cabell Hall
Hospital Drive
Jefferson Park Avenue
Jefferson Park Avenue
Lambeth Field
Rugby Road
University Avenue
Cherry Avenue
Preston Avenue
West Main Street
Downtown Charlottesville
Hospital Visitor Parking
University Hospital

Safety at UVA
For the safety of students, faculty, staff and visitors, the University has established lighted paths on high-traffic walking routes and has installed emergency phones around the Grounds (look for outdoor phones with a blue light). Acquaint yourself with the locations of these phones, and use safety precautions, particularly at night. For more information or to report a crime, call the University Police at (434) 924-7166.

Visitor Parking and Parking for People with Disabilities
Hourly visitor parking and parking for persons with disabilities are available throughout the Grounds in many surface lots and in almost all parking garages. For more information on parking for persons with disabilities, please go to http://gis.virginia.edu/Pages/Accessibility.aspx or call (434) 924-7231.

No. 112. - National Radio Astronomy Observatory (Stone Hall) - Edgemont Road.

No. 191 - Slaughter Recreation Center - parking for symposium

No. 195 E - Ern Commons (April 4th AM activities)

Hospital and Primary Care Center Parking
At the Medical Center, parking is available in the Lee Street Patient Parking Garage (patients and visitors to patients only). The 11th Street Parking Garage is available to patients, visitors/guests, and employees with authorized permits. Have your garage ticket validated at the clinic you are visiting (for patients) or the Information Desk in the hospital main lobby (for patients' visitors). Guests to staff, vendors, and other visitors, and permit holders should park in the 11th Street Parking Garage on levels C-G. Information on other parking issues, including oversize vehicles, is available at the hospital entrance.
For Medical Center questions or special assistance, call (434) 924-DOCS (3627) or (800) 251-3627 (toll-free).

Hospital and Major Patient Care Areas
Transitional Care Hospital (see directional arrow)
Northridge Medical Office Building (see directional arrow)
Fontaine Research Park (see inset)

142	G7	Children's Hospital at the Battle Building
149	E7	Elson Student Health Center
150	F7	Emergency Department
151	F7	Jefferson Park Medical Office Building (1222 JPA)
162	F7	Primary Care Center (1121 Lee Street)
165	F7	University Hospital
168	E8	UVA Outpatient Surgery Center
169	F7	West Complex
178	E3	Frank C. McCue III Center

The Eleven Schools of the University

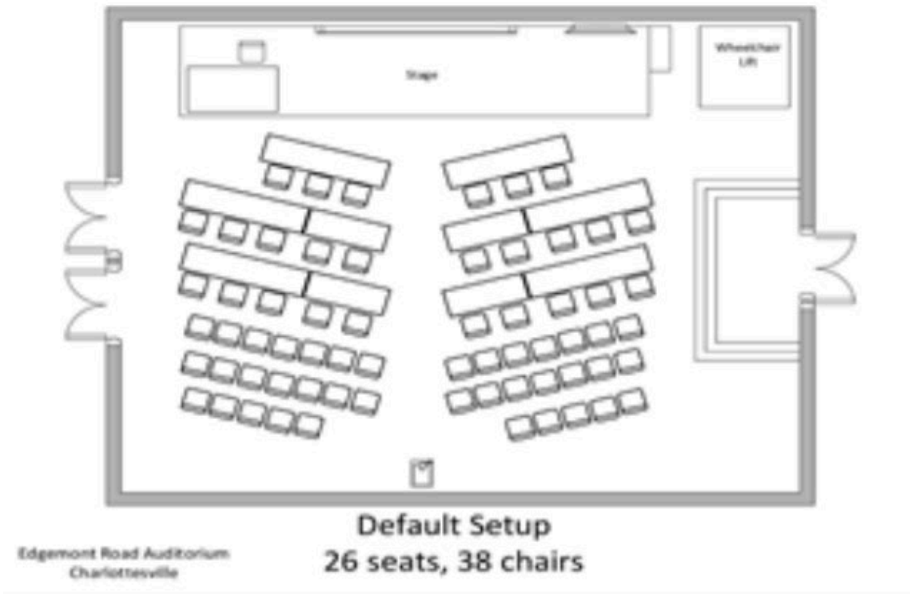
25	E5	School of Architecture
35	D1	Darden School of Business
46	E6	Batten School of Leadership and Public Policy
64	D1	School of Law
83	E7	College and Graduate School of Arts & Sciences
104	E7	McIntire School of Commerce
106	D6	Currey School of Education
115	D7	School of Engineering and Applied Science
124	B5	School of Continuing and Professional Studies
144	F7	School of Nursing
157	F7	School of Medicine

UVA Geospatial Engineering Services
http://gis.virginia.edu

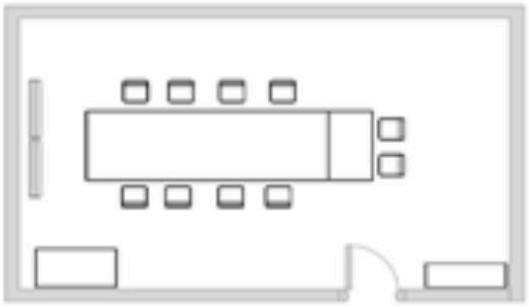
8/5/2019

NRAO Stone Hall (Edgemont Road) Rooms

Auditorium (Capacity 85 individuals)

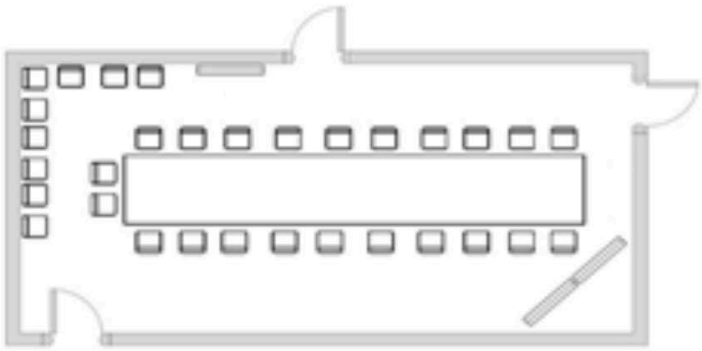


Room 209 (Capacity 22 individuals)



Default Conference Setup – 10 Seats

Room 230 (Capacity 30 individuals)



Default Conference Setup – 22 Seats

Graduate School Guide

Building off the LSAMP Alumni and Industry Panels, this guide is designed to provide information about institutions within North Carolina and Virginia with Graduate Programs.

Appalachian State University:
Victoria S. Carlberg, *Associate Director, Graduate Admissions*
232 John E. Thomas Hall
ASU Box 32068
Boone, NC 28608
Phone: 828-262-7133
Email: carlbergvs@appstate.edu

East Carolina University:
East Carolina Graduate School
Ragsdale Hall, Suite 131
Mail Stop 570
Greenville, NC 27858-4353
Phone: 252-328-6012
Email: gradschool@ecu.edu

Elizabeth City State University:
Mr. Brian Wayne, *Graduate Recruiter*
Office of Graduate Education
1704 Weeksville Road
Elizabeth City, NC 27909
Phone: 252-335-3293
E-mail: brwayne@ecsu.edu

George Mason University:
Office Location: 213 Johnson Center (2nd Floor)
Office of Graduate Admissions
4400 University Drive, MSN 4C8
Fairfax, Virginia 22030
Phone: 703-993-9700
E-mail: masongrad@gmu.edu

Graduate School Guide

Building off the LSAMP Alumni and Industry Panels, this guide is designed to provide information about institutions within North Carolina and Virginia with Graduate Programs.

Hampton University:

Gradute College - Wigwam Hall 203
Hampton, Virginia 23668
Phone: 757-727-5454
E-mail: hugrad@hamptonu.edu

James Madison University:

Beth Johnson, *Assistant Director, Graduate Admissions*
Office Location: 100 E. Grace St.
MSC 6702
Harrisonburg, Virginia 22807
Phone: 540-568-2301
Email: johns8ba@jmu.edu

Norfolk State University:

Nicolette Dungee, Graduate Recruiter
Office of Graduate Studies
McDemmond Center for Applied Research (MCAR)
Suite 602
700 Park Avenue
Norfolk, VA 23504
Phone: (757) 823-8015
Email: nldungee@nsu.edu

North Carolina Agricultural and Technical State University:

The Graduate College
120 Gibbs Hall
1601 East Market St.
Greensboro, NC 27411
Phone: 336-285-2366
Email: grad@ncat.edu

Graduate School Guide

North Carolina Central University:
Holder, Ta'Keyah M, Director of Graduate Admissions, Recruitment, and Marketing
1801 Fayetteville Street
Taylor Education Building, Room 123B
Durham, NC 27707
Phone: 919-530-7388
Email: tholder2@NCCU.EDU

North Carolina State University:
1020 Main Campus Drive
Room 2300A
Campus Box 7102
Raleigh, NC 27695-7102
Phone: 919-515-2872
graduate-school@ncsu.edu

Old Dominion University:
Elaine Ross, *Coordinator of Graduate Recruitment*
Office Location:
1000 Rollins Hall
Norfolk, VA 23529
Phone: 757-683-7194
E-mail: emross@odu.edu

Radford University:
Tracey Drowne, *Director of Graduate Recruitment*
Whitt Hall
PO Box 6928
Radford, VA 24142
Phone: 540-831-5327
Email: tpdrowne@radford.edu

University of North Carolina Chapel-Hill:
The Graduate School
Box #4010, 200 Bynum Hall
University of North Carolina
Chapel Hill NC, 27599-4010
Phone: 919-962-7772
Email: gradadmissions@unc.edu

Graduate School Guide

University of North Carolina Charlotte:
Office Location: Reese Building, Fifth Floor
Graduate Admissions, Office of the Dean and Graduate
Academic & Student Affairs
9035 University Rd.
Charlotte, NC 28233
Phone: 704-687-5503
Email: gradcounselor@uncc.edu

University of North Carolina Greensboro:
270 Mossman Building
1202 Spring Garden Street
Greensboro, NC 27412
Phone: 336-334-5596
Email: gradinquiry@uncg.edu

University of Mary Washington:
1301 College Ave.
Fredericksburg, VA 22401
Phone: (540) 654-5862
Email: graduate@umw.edu

University of North Carolina Wilmington:
UNCW Graduate School
601 S. College Road
James Hall
Wilmington, NC 28403-5955
Phone: 910-962-7303
Email: GradSchool@uncw.edu

University of Virginia:
Central UVA Graduate Admission
PO Box 401102
Charlottesville, VA 22904
Phone: (434) 243-0209
E-mail: gsasadmission@virginia.edu

Graduate School Guide

Virginia Commonwealth University:
VCU Office of Admissions
1001 Grove Ave.
Box 843032
Richmond, VA 23284-3032
Phone: (804) 828-6916
Email: gradmail@vcu.edu

Virginia Tech:
Graduate Admissions (0325)
Graduate Life Center at Donaldson Brown
155 Otey Street
Graduate School, Virginia Tech
Blacksburg, VA 24061
Phone: 540-231-6691
Email: grads@vt.edu

Western Carolina University:
1 University Dr.
110 Cordelia Camp
Cullowhee, NC 28723
Email: grad@wcu.edu

Winston-Salem State University:
Graduate Admissions
601 S. Martin Luther King Jr. Drive
Winston-Salem, NC 27110
Phone: 336-750-2000
Email: graduate@wssu.edu

The VA-NC Alliance thanks all of its partner institutions for their participation in the symposium.

Bennett College
Elizabeth City State University
George Mason University
Johnson C. Smith University
National Radio Astronomy Observatory
Old Dominion University
Piedmont Virginia Community College
St. Augustine's University
University of Virginia
Virginia Commonwealth University
Virginia Tech

We especially appreciate all of the student presenters for showcasing their research!

Connect with the VA–NC Alliance