COMMITTEE MEMBERS PRESENT
Dr. Tonya Parris-Wilkins, Chair
Dr. Shantaram Talegaonkar, Vice Chair
Ms. Ellen Fitzsimmons
Dr. Dale Jones
Ambassador Carmen Lomellin
Rev. Tyrone E. Nelson
Mr. Keith Parker

OTHER BOARD MEMBERS PRESENT
Mr. Ben Dendy, Rector
Ms. Carolina Espinal, Vice Rector
Mr. Todd Haymore

OTHERS PRESENT
Dr. Michael Rao, President
Dr. Fotis Sotiropoulos, Provost and Senior Vice President for Academic Affairs
Dr. Marlon Levy, Interim Senior Vice President for Health Sciences and CEO of the VCUHS
Dr. Aaron Hart, Vice President for Student Affairs
Dr. Hernan Bucheli, Interim Vice President for Strategic Enrollment Management and Student Success
Dr. Srirama Rao, Vice President for Research and Innovation
Ms. Jamie Stillman, Director of Strategic Communications, Office of the Provost
Members of the VCU Board of Visitors Presidential Cabinet of VCU
VCU students, faculty and staff
Members of the media

CALL TO ORDER
Dr. Tonya Parris-Wilkins, Chair of the Academic and Health Affairs Committee, called the meeting to order at 2:45 p.m. The public was able to view the open session of the meeting via livestream at https://mssvideo.vcu.edu/BOV.
ACTION ITEMS
Dr. Parris-Wilkins began by asking the committee to consider approving three items that were provided in advance for review: the March 23, 2023 committee meeting minutes, a proposal to close a partially-exempt off-campus instructional site used by the Department of Nurse Anesthesia at 6295 Edsall Road, Alexandria, Va., and a proposal to open a partially-exempt off campus instructional site for use by the Department of Nurse Anesthesia at 5285 Shawnee Road, Alexandria, Va. On a motion duly made and seconded, each of the three items were approved. The meeting minutes are posted at https://bov.vcu.edu/meetings/minutes/. Copies of the two proposal briefs are attached hereto as Attachment A and are made a part hereof.

REPORTS
Provost and Senior Vice President for Academic Affairs Fotis Sotiropoulos introduced a panel of faculty who have received National Science Foundation (NSF) awards. The panelists discussed their research and its impact. A copy of the handout profiling each of the six panelists and their slide presentations is attached hereto as Attachment B and is made a part hereof.

Dr. Marlon Levy, interim senior vice president for health sciences and CEO VCU Health, provided updates on updates on issues pertaining to the health sciences schools and campus. A copy of the presentation slides is attached hereto as Attachment C and is made a part hereof.

Vice President for Research and Innovation P. Srirama Rao provided an annual overview on VCU’s Technology and Commercialization Program. A copy of the presentation slides is attached hereto as Attachment D and is made a part hereof.

ADJOURNMENT
There being no further business, Dr. Parris-Wilkins adjourned the meeting at 4:20 p.m.
Virginia Commonwealth University
Proposed Organizational Change Brief

Proposal
Virginia Commonwealth University (VCU) requests approval to close a “partially-exempt” off-campus instructional site at 6295 Edsall Road, Alexandria, VA.

Overview
The purpose of the proposed change is to close an off-campus instructional site that is no longer available or suitable for ongoing academic operations. VCU’s presence in northern Virginia dates back to 2012 with the opening of an off-campus instructional site at 6295 Edsall Road. Since its establishment, the off-campus site has offered the Doctor of Nurse Anesthesia Practice (DNAP) program. Multiple lease renewals for the space were executed until the off-campus site at Edsall Road was scheduled for demolition in 2022 by the owner of the building. Subsequent changes in building ownership and plans for the Edsall Road location, a lack of lease renewal options at the site, and the limitation of the space to support the educational and career needs of CRNAs necessitates the need to close the Edsall Road “partially-exempt” off-campus instructional site.

Target Implementation Date
August 13, 2023

Impact on Existing Programs/Policies
There is no impact to existing programs and policies. There will be no interruption to activities for nursing students in the DNAP program and students will be transitioned to a new location.

Impact on Faculty
There is no impact on faculty.

Funding
The proposed organizational change to close the Edsall Road off-campus instructional site is executable within the budget of the VCU College of Health Professions’ currently authorized funds. No additional expenses are required to implement the change.

Next Steps
April 27, 2023 - University Committee on Academic Affairs and University Policies (UCAAUP) Meeting
May 4, 2023 - University Council Meeting
Electronic Vote - President's Cabinet Meeting
May 12, 2023 - Board of Visitors’ Meeting
May 13, 2023 – Proposal shared with SCHEV
Proposal
Virginia Commonwealth University (VCU) requests approval to establish a “partially-exempt” off-campus instructional site at 5285 Shawnee Road, Alexandria, VA.

Overview
The purpose of the proposed organizational change is to establish a new “partially exempt” off-campus site to replace an off-campus site slated for closure. The new off-campus site will continue to provide an academic program in an area of the state where there is a pressing and ongoing need for certified registered nurse anesthetists (CRNAs). VCU’s presence in northern Virginia dates back to 2012 with the opening of an off-campus instructional site at 6295 Edsall Road. Since its establishment, the off-campus site has offered the Doctor of Nurse Anesthesia Practice (DNAP) program; training future nurse anesthesia students to meet the ongoing demand for Certified Registered Nurse Anesthetists at hospital facilities in the geographic region. Multiple lease renewals for the space were executed until the off-campus site at Edsall Road was scheduled for demolition in 2022 by the owner of the building. Subsequent changes in building ownership and plans for the Edsall Road location, a lack of lease renewal options at the site, and the limitation of the space to support the educational and career needs of CRNAs necessitates the need to establish a new “partially-exempt” off-campus instructional site. This new site will be located Poplar Run Office Building, 5285 Shawnee Road, Alexandria, VA.

Demand
There are no other nurse anesthesia programs operating in the northern Virginia region of the state of Virginia. For the three most recent admissions cycles, the DNAP program received three to five times the number of applications for admission (36 in 2020, 43 in 2021, 53 in 2022) relative to the number of available spaces.

Target Implementation Date
August 13, 2023

Impact on Existing Programs/Policies
There is no impact to existing programs and policies. There will be no interruption to activities for nursing students in the DNAP program. Furthermore, the new space will have a positive impact on the learning environment and the reputation of the DNAP program and VCU.

Impact on Faculty
There is no impact on faculty.

Funding
No additional expenses are required to implement the change. All costs for administrative positions, faculty, and operating expenses will be funded by tuition and fees collected at the proposed off-campus site.

Next Steps
April 27, 2023 - University Committee on Academic Affairs and University Policies (UCAAUP) Meeting
May 4, 2023 - University Council Meeting
Electronic Vote - President's Cabinet Meeting
May 12, 2023 - Board of Visitors’ Meeting
May 13, 2023 – Proposal shared with SCHEV
Dr. Fife is an Associate Research Professor of STEM Education in the department of Foundations of Education at Virginia Commonwealth University. His current research focuses on building resilience and STEM identity in underserved youth by constructing and implementing culturally relevant interventions. He currently serves as the Principal Investigator on two NSF grants. The Building Capacity in STEM Education Research award (BSCER), utilizes an innovative psychological theory (PVEST) to explore STEM interest, attitudes and resilience among underserved middle school students. The MCA award is designed to create and implement a comprehensive and robust STEM learning ecosystem in Central Virginia.

Priscilla Hwang, PhD is an Assistant Professor in Biomedical Engineering and associate member of Massey Cancer Center. She received her BS degree in biomedical and electrical engineering from Duke University. After her bachelor’s degree, Priscilla was a Whitaker International Research Fellow in Holland where she developed ex vivo models of musculoskeletal pathologies, before returning to Duke to pursue her MS and PhD in biomedical engineering as a NSF Research Fellow. Prior to joining VCU, Priscilla was an American Cancer Society Postdoctoral Fellow at Washington University in St Louis where she developed 3D microphysiological systems to study cancer invasion. Currently, her overarching research interests lie in developing microphysiological models to study disease progression, including cancer, with funding from NSF and NIH.
Carlos Castano is a Tenure-Track Assistant Professor in the Department of Mechanical and Nuclear Engineering VCU. Dr. Castano received a B.S. in Engineering Physics and an M.S. in Engineering from the National University of Colombia. He worked for four years in industry before obtaining his Ph.D. in Materials Science and Engineering at Missouri S&T. He joined VCU in 2014, holding appointments as Postdoctoral Fellow, Research Associate at the NCC, and Assistant Research Professor before the tenure-track position. Dr. Castano has received numerous recognitions, including the NSF Career Award, honorary ALPHA SIGMA MU member, Roberto Rocca Fellow, and inducted into the National Academy of Inventors chapter at VCU.

Dr. Fantasy T. Lozada is an Associate Professor of Psychology. She completed her Ph.D. in Developmental Psychology at NC State University and an NSF Postdoctoral Fellowship at the University of Michigan. Dr. Lozada specializes in innovative methods for studying cultural processes in the emotional lives of youth and families. Her recent projects include: (1) understanding emotional code-switching among African American middle schoolers in Richmond and (2) developing a positive youth development high school leadership program for Richmond high schoolers. Dr. Lozada is a current recipient of an NSF CAREER Award and a grant recipient of over $7 million in federal funding.
Dr. Jennifer Puetzer is an Assistant Professor in Biomedical Engineering. Her lab focuses on engineering meniscus, tendon, and ligament replacements, with interest in hierarchical collagen-fiber formation, bone-integration, and effects of aging. Her degrees are in Biomedical Engineering, with a B.S. from NC State, and Ph.D. from Cornell University. In 2014, she received a Whitaker International Fellowship to perform her postdoc at Imperial College London. Her contributions to tissue engineering have been recognized through selection for the Tissue Engineering Young Investigator Council, Wake Forest Institute of Regenerative Medicine Young Investigator Award, UK Regenerative Medicine Special Merit Award, and NSF CAREER award.

Joshua Sieber was introduced to chemical research initially as an undergraduate at Penn State University in the laboratories of Professor Ayusuman Sen. He received his B.S. degree in Chemistry from Penn State University with Honors in Chemistry in 2003. He then pursued a PhD degree in Chemistry working in the laboratories of Professor James Morken initially at the University of North Carolina at Chapel Hill followed by Boston College. His graduate work focused on the development and application of catalytic asymmetric diboration and conjugate allylation reactions. After receiving his PhD degree from Boston College, he became an American Cancer Society postdoctoral fellow in the laboratories of Professor Barry Trost at Stanford University where he completed the asymmetric total synthesis of Soraphen A and applied Pd-catalyzed asymmetric allylic alkylation (AAA) reactions to natural product total synthesis. After completing his postdoctoral work, he then accepted a position as a senior scientist in the process chemistry group at Boehringer Ingelheim Pharmaceuticals, Inc. in 2011 where he developed scalable processes towards new pharmaceuticals and served as a member of the Boehringer Ingleheim’s Chemical Catalysis Center of Expertise developing scalable catalytic processes and new catalysts for organic synthesis. After being promoted to Principal Scientist in 2016, he accepted his current position as assistant professor of chemistry at Virginia Commonwealth University. His research interests include development of new catalysts and catalytic methods for complex organic molecule synthesis and process chemistry.
Provost’s Report

Fotis Sotiropoulos, Ph.D.
Provost and Senior Vice President for Academic Affairs

VCU Board of Visitors
Academic and Health Affairs Committee
May 11, 2023
John Fife, Ph.D., assistant professor
Department of Foundations of Education
School of Education
Building a STEM Learning Ecosystem in Central Virginia

John Fife, Ph.D.
Associate Research Professor of STEM Education
Research Interest

• Using PVEST to predict STEM interest and attitudes.
  • Building STEM identity and resilience among underserved youth *(NSF-BCSER)*
  • Use of educational Robotics to enhance computational thinking in students

• Construction and evaluation of STEM ecosystems
Results
What are STEM Learning Ecosystems?

- “...An intentional, collaborative, systems-thinking approach to help communities optimize STEM as a tool advancing students, educators, educational systems, and business and industry towards a dynamic, responsive, nimble and thriving workforce and local economy.”

- NSF Award # 2219175- MCA - Title: Using STEM Interest Profiling to Build a STEM Learning Ecosystem in the Central Virginia Area
Priscilla Hwang, Ph.D., assistant professor
Department of Biomedical Engineering
College of Engineering
Microphysiological systems to study cell migration

Priscilla Hwang, PhD
Assistant Professor
Biomedical Engineering
Massey Cancer Center

5/11/23
Modes of Migration

**Individual cell migration**
- Lack of cell-cell interactions
- Low correlation between neighboring cells

**Collective cell migration**
- Groups of cells retain cell-cell adhesions
- Heterogeneous cell populations
- Majority of metastasis occurs via collective migration
Microphysiological systems to mimic dynamic extracellular matrix cues \textit{in vitro}

Hwang et al. \textit{Developmental Cell} 2023
Hwang et al. \textit{Cancer Research} 2019
Shirure et al. \textit{Angiogenesis} 2017
Corinne Leonard, BS
Jessanne Lichtenberg, MS
Santiago Lopez
Amanda Pearson
Logan Petry, BS
Trey Redman
Jesse Rolston
Sydnie Tran, BS

https://pyhwanglab.wixsite.com/website
@priscilla_hwang

Nanomaterials Core Characterization (NCC)
Microelectronics Center (VMC)

VCU
Chris Lemmon
Rebecca Heise
Paula Bos
Paul Fisher
Swadesh Das

Gregory Longmore
(Washington University)
Amit Pathak (Washington University)
Daniel Conway (OSU)
Brenton Hoffman (Duke)
Steven George (UC Davis)
Carlos Castano Londono, Ph.D., assistant professor
Department of Mechanical and Nuclear Engineering
College of Engineering
Our research group focuses on tailoring the surface properties of materials by physical and chemical methods for multiple engineering applications.

**CAREER: Advanced Surface Coating of Metallic Powders by Vibration-Enhanced High-Power Impulse Magnetron Sputtering for Sintering-Based Manufacturing**

**Hypothesis**

- Mixed Powders High-Heating Rate Sintering
- Heat Flux Direction
- High-heating Rate
- Anisotropic Growth
- Core-Shells enable new materials for Conventional & AM
- Controlled Grain Growth
- Core-shells Using HiPIMS
- Temperature

---

**Carlos E. Castano, Ph.D.**

Assistant Professor
Mechanical and Nuclear Engineering

May 11th, 2023
Cores: Metals

Inside our System
Deposit Shells @ Cores

Core/Shells – Pressed Pellets

Metal Powder Market ~ Currently $5 Billion
Forecast 2028 ~ $ 10 Billion

Metal Additive Manufacturing
~ US Market $135 Million
Forecast by 2030 close to $ 1 Billion

Broader Impacts

Diversity in SurfACE Lab

Synergistic Collaborations

Virtual Tutorials
Nanomanipulations, properties, manufacturing
Faculty Panel

Fantasy Lozada, Ph.D., associate professor
Department of Psychology
College of Humanities and Sciences
We have 400 emotion experiences a day!
- attention, decisions, and social relationships

Our emotion skills in kindergarten are related to:
- education, employment, criminal activity, substance abuse, & mental health

Emotion science informs mental health therapies and interventions:
- but the science lacks the experiences of youth and families of color
"Our emotions aren't for everyone. Everyone's not ready for it."

- Educators are less accurate recognizing emotions expressed by African American children's faces; they see anger when it's sad, fear, or happy.

- African American parents worry their children aren't safe to express their emotions; ruined life chances or an early death.

- Emotion suppression associated with stressed cardiac activity, heart disease, cancer, and early death.
- Families in Richmond
- Student in the 6th grade & 1 parent
- 1-year and 2-year follow up

More effective emotion/mental health programs and interventions
"Our emotions are for a healthier us."
Faculty Panel

Jennifer Puetzer, Ph.D., assistant professor
Department of Biomedical Engineering
College of Engineering
Engineering Functional Musculoskeletal Repairs & Replacements

Jennifer Puetzer
Assistant Professor
Departments of Biomedical Engineering and Orthopaedic Surgery
Virginia Commonwealth University, Richmond, VA
Orthopaedic Tissues are Strong due to Collagen

Engineered and repair tissues fail to create organized collagen essential to clinical success

[Ortis et al. 2014]

[Meniscus and Tendon/Ligament images: Kawamura 2003]

[Collagen structure: Hast 2014]
Driving Collagen Hierarchical Structure

Tropocollagen ~1.5 nm

Microfibrils ~10 nm

Fibrils ~10-300 nm

Fibers ~10+ µm

Fascicles ~100s µm - mm

Collagen mixed with NaOH and PBS

Collagen-Cell Mix

Sheet Gel

Incubated at 37˚C for 60 mins.

Clamping Device

Collagen, Cells

Fibril

Fiber

Fascicle

Engineered Tissue

Native Meniscus
Puetzer Lab Interests

Hierarchical Collagen
- Tropocollagen: ~1.5 nm
- Fibrils: ~10-300 nm
- Fibers: >10 μm

Fiber Development
- Enzymatic Crosslinking
  - Clamps
  - Collagen
  - Mechanical Stimulation

Interface Engineering
- β-TCP
- Collagen
- Hard to Soft Tissue Transition
  - Mechanical Stimulation

Effect of Aging and Injury
- Non-Enzymatic Crosslinking
- Injury Response
  - [Kawamura 2003]

Tendon/Ligament
- [Hast 2014]

Meniscus
- Superficial zone
- Radial fibers
- Circumferential collagen fibers

[Image of joint or tissue structure]
Acknowledgements

**Virginia Commonwealth University**

Graduate Students
- Ethan Brown
- Austin Gouldin
- Leia Troop
- Kelly Otts
- Tristan Strayer

Undergraduate Students
- Madison Bates
- Panth Doshi
- Raza Haider
- Reem Hammad
- Saagar Sheth
- Alex Samson
- Rudav Katiravan
- Kyle Warner
- Anisha Ponugupati

**Collaborators**
- René Olivares-Navarrete (VCU)
- Kelly Lambert, Ph.D (U of R)
- Molly Kent, Ph.D (U of R)
- Nirav Patel (VCU Health)
- Gregory Golladay (VCU Health)
- Matthew Halquist (VCU Pharmacy)

**Imperial College London**

- Molly Stevens
- Ignacio Sallent
- Tianchi Ma
- Amy Gelmi

---

**@PuetzerLab**

---

**NSF CAREER #2045995**
Joshua Sieber, Ph.D., assistant professor
Department of Chemistry
College of Humanities and Sciences
Sieber Research Group: Organic Chemistry

Overview

Chemical depictions (alcohols):

- **Methanol**: Indy-car fuel (toxic)
- **Ethanol**: active ingredient in alcoholic beverages (toxic in excess)
- **Isopropanol**: rubbing alcohol (toxic)

- **Chemical structure dictates function!**

- **Pharmaceuticals:**
  - **Acetaminophen**: (Tylenol)
  - **Morphine**: (pain reliever)
  - **Nevirapine**: (HIV)
**Sieber Research Group Overview**

**Mission:** improve access to high-quality medications across the globe by driving down production costs.

https://medicines4all.vcu.edu/

**Synthetic Methods**

**Catalyst Development**

**Green Syntheses of APIs and Materials**

- New Methods & Processes
  - 1. Asymmetric umpolung techniques to access heteroatom-rich organic compounds
  - 2. Asymmetric amine synthesis

**New inhibitors of peripheral membrane proteins (PMP)**

with Brian Fuglestad (Chemistry)

https://sieberresearchgrp.com
Chemical structure for function related to our sense of smell

- **Acetic acid (vinegar):** \(\text{CH}_3\text{CO}_2\text{H}\)
- **Isoamyl acetate (banana):** \(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{O}_2\text{CCH}_3\)
- **Ethyl butyrate (pineapple):** \(\text{CH}_3\text{CH}_2\text{CH}_2\text{O}_2\text{CCH}_3\)}
Health Affairs Update
VCU Board of Visitors
Academic and Health Affairs Committee (AHAC)
May 11, 2023
College of Health Professions

- Enrollment up 28% over 2022; leads the University in enrollment growth
- New BS program: 160 majors
- Research funding up 96% over FY2018
- Dept of Gerontology received American Society in Aging award for anti-agesim work
- Nursing - Anesthesia #1 graduate program from U.S. News rankings
- 100% employment in the field for December 2022 Doctor of Nurse Anesthesia Practice
- Created digital badges for CRNAs - digital verification of skills/training
School of Dentistry

- Advance inclusive excellence in the School - Increasing faculty diversity enrollment and training
- DDS student recruitment strong - cannot accommodate demand in current building
- Residency enrollment up in Orthodontics, Periodontics, Endodontics, and Oral Maxillofacial Surgery - successful match
- Outstanding performance on the integrated National Dental Board Examination
- Continue addressing access to care especially for underserved populations/regions
- Recruited Chairperson of Pediatric Dentistry: Dr Jeffrey Johnson DDS, MS, MPH
- Expanding innovative research, some in partnership with Massey

VCUHealth
School of Medicine

- New Dean: Dr. Art Saavedra
- Dr. Vanessa Sheppard honored as American Cancer Society’s researcher of the year
- Medical Scientist Training Program grant from the NIH awarded to M.D.-Ph.D. program - Triple crown of institutional NIH awards
- Blue Ridge Rankings - Total NIH funding up more than 10%, topping $71M, thanks to a net increase of 10 awards
- Preparing for accreditation site visit February 2024
- Teaching & Research Faculty activity points project: Annual Activity Score and new compensation structure will assist with department realignment
School of Nursing

• To address workforce shortages - Increased students admitted to prelicensure programs
  – 15% increase in admissions to the traditional prelicensure program- 30 in January 2023
  – VCU Health, the Richmond VA Medical Center, others have committed to ensuring clinical placements additional students

• FY23 is a record year in external funding
  – Raised $15.1M in FY23, representing 745% over the goal, thanks in large part to a $13M student scholarship gift from Mr. and Mrs. Conway

• Continued growth in sponsored research with $6.28M projected for FY23; $7.0M actual in FY22 - represents 235% increase over the previous 5-years
School of Pharmacy

- School of Pharmacy continued accreditation through 2031 - maximal period
- Resubmitted Bachelor of Science in Pharmaceutical Sciences to SCHEV
- Re-initiation of international practice-based experiences for P4 students
- Next Generation Pharmacist: Curricular redesign to meet student expectations and evolving healthcare landscape
Update on Technology Commercialization and Economic Impact

May 11, 2023

P. Srirama Rao, Ph.D., Vice President for Research and Innovation
10 years of impact through innovation at VCU

1,500+ patents filed
194 patents issued
189 licenses / options

103 startup jobs added
49 new products to market
8 new products from VCU start-ups

60+ startup companies
$80M+ in startup financing
>$30M in licensing revenue
VCU startups over the past 10 years

~60+ startups | ~$80M in funding | 8 products
VCU TechTransfer and Ventures
FY2022 Impact At-a-glance

- 122 invention disclosures
- 18 patents issued
- 10 startups
- 144 patents filed
- $3.1M licensing revenue
- ~30 potential startup opportunities*

*FY2023 in different phases of development
Growth in TechTransfer and Ventures

Licenses to startups (#)

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

(FY22 National Median: 4)

Licensing revenue ($) Including royalties

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>$1.7M</td>
<td>$2.08M</td>
<td>$2.2M</td>
<td>$2.7M</td>
<td>$3.03M</td>
</tr>
</tbody>
</table>

(FY22 National Median: $2.3M)

Invention disclosures

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>134</td>
<td>114</td>
<td>133</td>
<td>160</td>
<td>122</td>
</tr>
</tbody>
</table>

(FY22 National Median: 79)

Licenses & options

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>18</td>
<td>21</td>
<td>22</td>
<td>24</td>
<td>27</td>
</tr>
</tbody>
</table>

(FY22 National Median: 22)
FY2021 Technology Commercialization
National Peer Ranking

<table>
<thead>
<tr>
<th>FY2021 Peer Institutions</th>
<th>VCU Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on research expenditures</td>
<td>Relative to national peers</td>
</tr>
<tr>
<td>University of Rochester</td>
<td>#4 in startups</td>
</tr>
<tr>
<td>University of South Florida</td>
<td>#5 in invention disclosures</td>
</tr>
<tr>
<td>Iowa State University</td>
<td>#6 in licensing income</td>
</tr>
<tr>
<td>Princeton University</td>
<td>#6 in patent applications</td>
</tr>
<tr>
<td>Oklahoma State University</td>
<td></td>
</tr>
<tr>
<td>University of Miami</td>
<td></td>
</tr>
<tr>
<td><strong>Virginia Commonwealth University</strong></td>
<td></td>
</tr>
<tr>
<td>Louisiana State University System</td>
<td></td>
</tr>
<tr>
<td>Carnegie Mellon University</td>
<td></td>
</tr>
<tr>
<td>University of New Mexico/Sci. &amp; Tech. Corp.</td>
<td></td>
</tr>
<tr>
<td>Florida State University</td>
<td></td>
</tr>
<tr>
<td>Case Western Reserve University</td>
<td></td>
</tr>
<tr>
<td>Medical College of Wisconsin Research Foundation</td>
<td></td>
</tr>
<tr>
<td>University of Connecticut</td>
<td></td>
</tr>
</tbody>
</table>

*Analysis based on FY2021 AUTM data*
VCU faculty are at the forefront of innovation and entrepreneurship.

Blood clotting agent
Robert Diegelmann, Ph.D.,
School of Medicine

‘coursFACTS’
Jean Giddens, Ph.D.,
School of Nursing

Fighting cancer reoccurrence
Worth Longest, Ph.D.
College of Engineering

Olfactory implant
Richard Costanzo, Ph.D. (front left),
Daniel Coelho, M.D., (front right)
School of Medicine

Anti-cancer stem cell agents
Umesh Desai, Ph.D.,
School of Pharmacy

‘Nerve Tape’
Jonathan Isaacs, M.D.
School of Medicine
VR training tomorrow’s surgeons
Milos Manic, Ph.D., (right) in his lab with students Victor Cobilean (left) and Harindra Sandun Mavikumbure.
School of Engineering

How VR could help at-risk youth
Nicholas D. Thomson, Ph.D.
School of Medicine

VR training to improve “blind” surgery
Lauren Siff, M.D.
School of Medicine

VCU faculty are at the forefront of innovation and entrepreneurship
Impact of VCU Proof of Concept Funding

- 71 Projects funded
- $2.5M Awarded by Fund
- Year 7

- ~$38M In follow-on funding
- 17 Licenses
- 12 Start-ups
VCU Services for Inventors

- IP protection
- IP assessment and validation
- Technology maturation / de-risking
- Marketing and licensing
- Industry engagement
- Startup facilitation
- Education
OVPRI’s TechTransfer and Ventures Team
Tech Commercialization & Economic Impact
Achieved in collaboration with various state entities

Virginia Economic Development Partnership (VEDP)
Greater Richmond Partnership (GRP)
Virginia Innovation Partnership Authority/Corporation (VIPA/C)
Virginia Catalyst (VBHRC)
Activation Capital
VCU Commercialization Advisory Board

Comprised of industry experts, early-stage investors and entrepreneurs, the board provides guidance for critical commercialization and investment decisions.
Our 5-year vision for growth

2023: Present State

- $3.1M licensing revenues / year
- Inconsistent growth issued patents
- 10-20% yearly growth cash revenues
- 6-7 startups / year slow growing, faculty-run

2028: Future State

- $8-10M licensing revenues / year
- 40+ issued patents / year
- 1-2 VC rounds or exits / year
- 10-15 startups / year
- Fast growing startups quickly funded, CEO-run
Thank you for your time.

Questions, comments?