

**NC STATE**  
UNIVERSITY

**Genetics & Genomics Academy**  
**3rd Annual Retreat**

.....

*August 23, 2024*

*9:00 a.m. – 5:00 p.m.*

*Duke Energy Hall, Hunt Library*

# Retreat Schedule

## WELCOME AND UPDATES

8:30 AM Coffee and light breakfast

9:00 AM Opening remarks

9:45 AM Coffee Break, Posters & Vendors

- Please take a coffee break and visit the posters and vendors around the room.  
Retreat will reconvene at 10:15.

## SCIENCE TALKS (10:15 - 11:15 AM)

**Natalia Duque-Wilckens**, DVM, PhD, Biological Sciences

*Mast Cells: Linking Perinatal Exposures to Long-Term Physical and Psychological Vulnerability*

**Kasie Raymann**, PhD, Assistant Professor, Plant and Microbial Biology

*Using the Honey Bee as a Model System to Study the Ecology and Evolution of Beneficial and Pathogenic Microbes*

**Claire Gordy**, PhD, Associate Teaching Professor, Biological Sciences

presenting on behalf of the Biological Sciences Belonging Research Group

*Elevating Marginalized Student Experiences of Belonging in the Life Sciences: A Qualitative Case Study Approach*

**Trevor Walker**, PhD, Assistant Professor and Co-Director of the Tree Improvement Program

*Genetic Improvement of Pine Plantations After 68 years of Breeding*

**Paper of the Year Award Winner: Daniel B. Sulis**, PhD, Postdoctoral Fellow,

Forestry and Environmental Resources

*Using CRISPR Genome Editing Technology to Modify Wood for Sustainable Fiber Production*

## MORNING CONTEST WINNER ANNOUNCEMENT & RIG PRESENTATIONS

11:15 AM Announce Summer Contest Winners

11:30 AM Research Interest Group Presentation

# GGA 3rd Annual Retreat

## LUNCH, POSTERS, & VENDORS

12:00 PM Lunch will be served. Please feel free to continue to visit vendors and view posters during this time.

## STORYTELLING TALKS (1:30 TO 2:30 AM)

**Carlos Goller**, PhD, Teaching Professor, Biological Sciences

**Matthew Neubauer**, PhD, Postdoctoral Fellow, Forestry and Environmental Resources

**Isabella Livingston**, PhD Candidate, Genetics Program

**Emma Droste**, PhD Student, Genetics Program

**Bruce Schulte**, PhD, Head of Department, Biological Sciences

## BREAK & AFTERNOON CONTEST WINNER ANNOUNCEMENT

2:30 PM Please take a coffee break and visit the posters and vendors around the room. Retreat will reconvene at 3:30 PM. Submit your votes by 3:15!

3:30 PM Announce Poster Contest and T-shirt Contest Winners

3:45 PM Recognize Winners of Seed Grants and Bridge Fund Grants

## KEYNOTE SPEAKER PRESENTATION & CLOSING

4:15 PM **Keynote Speaker: Fred Gould**, PhD, William Neal Reynolds Professor of Agriculture, Entomology and Plant Pathology

*Genetics and Society: Past, Present, and Future*

5:00 PM Closing Remarks and Announce Happy Hour

## HAPPY HOUR AT RALEIGH BREWING COMPANY (5:30 - 7:00 PM)

Address: 3709 Neil St, Raleigh, NC 27607

# History of Genetics at NC State

The GGA builds off a legacy of genetics and genomics excellence at NC State. Genetics has been at the core of NC State’s basic and applied biological research since the 1940s. Pioneering luminaries in the field such as Barbara McClintock and Richard Lewontin have passed through our doors. Eleven NC State faculty members working in genetics have been elected to the National Academy of Sciences. This did not happen by chance. A series of university administrators have seen progress in basic and applied genetics as essential to our mission as a land grant university.

Jeff Yoder becomes Executive Director of the GGA.

August 2024



The Genetics and Genomics Academy becomes an official NC State unit under Fred Gould as Executive Director.

2020



Trudy Mackay  
*Drosophila Genetic Reference Panel*



Inception of the GGI  
2018

Buckler, Holland et al.  
*Maize Genetics Architecture*

Rodolphe Barrangou  
*CRISPR*

Pond & Muse  
*HyPhy Evolution Software*

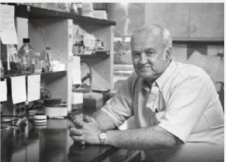
Genomic Sciences Graduate Program  
Bioinformatics Research Center

Zhao-Bang Zeng  
*QTL Analysis Methods*

Charles Studer  
*Marker-Aided Selections*

Major Goodman  
*Maize Genetic Diversity*

Charles “Sam” Levings  
*Cytoplasmic Sterility*



Weir Cockerham  
*FST Measurement*

Barbara McClintock  
*Visiting Professor*

Stanley Stephens  
*Polyploid Evolution*



Gertrude Cox  
*Textbook: Experimental Designs*



Genetics PhD Program Authorized

Richard Lewontin

Comstock & Robinson  
*Estimation of Dominance Variance*



# GGA Leadership



## GGA Executive Director, Jeff Yoder

On August 1, 2024 we welcomed Jeff Yoder, PhD, as the new Executive Director of the GGA. Dr. Yoder has been a faculty member at NC State since 2004 and served on the GGA Executive Committee since its inception at the Genetics and Genomics Initiative (GGI) in 2018. He most recently served as the Head of Research Programs.

## Keynote Speaker, Fred Gould

Fred Gould, PhD, our former GGA Executive Director, will present “Genetics and Society: Past, Present and Future”. Dr. Gould served as the Executive Director from 2020 to 2024 and was involved in the GGA since its inception as the Genetics and Genomics Initiative (GGI) in 2018. Dr. Gould has been a champion of the genetics community at NC State since the 1970s.

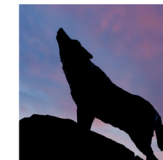


NC STATE  
UNIVERSITY

Genetics and  
Genomics Academy

# GENETICS & GENOMICS SEMINAR SERIES

Fall 2024 | Mondays @ 1:30pm | Stephens Room (3503 Thomas Hall) and ZOOM



AUG 19

**GGA Student Flash Talks**



SEP 23

**Lisa Chadwick**  
*NIH Human Genome*



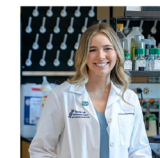
OCT 28

**Alex Domburg**  
*UNC Charlotte*



AUG 26

**Kevin Donohue**  
*Syngenta*



SEP 30

**Cortney Gensemer**  
*Medical University of SC*



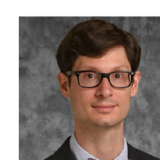
NOV 4

**Julia Kreiner**  
*UBC - International*



SEP 9

**Parul Johri**  
*UNC Chapel Hill*



OCT 7

**Nathan Crook**  
*North Carolina State University*



NOV 11

**AJ Robison**  
*Michigan State University*



SEP 16

**Robin Hopkins**  
*Harvard University*



OCT 21

**Sara Brownell**  
*Arizona State University*



NOV 18

**Levent Atici**  
*North Carolina State University*

Learn more at [gga.ncsu.edu/seminar-series](https://gga.ncsu.edu/seminar-series) and join the GGA email list!

# 2024 - 2025 GG Scholars Cohort

# Paper of the Year



**Tomo Adams**  
Entomology



**Edeline Anthoniraj**  
Microbiology



**Ty Bradley**  
Toxicology



**Trip Brooks**  
FWCB



**Kiran Daulla**  
Genetics



**Meghan Dillon**  
Toxicology



**Jessica Ding**  
Entomology



**Audrey Fahey**  
Genetics



**Zehta Glover**  
Genetics



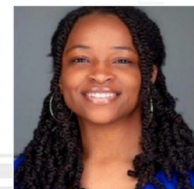
**Cameron Grey**  
Genetics



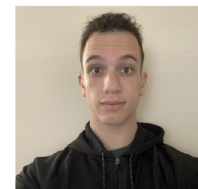
**Shirley Jacquet**  
Biology



**Sarah Jeffers**  
Biology



**Alex Johnson**  
Biomathematics



**Robby King**  
Biochemistry



**Jaylin Knight**  
Genetics



**Anne Lindbergh**  
Entomology



**Erin Logan**  
Plant Biology



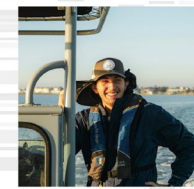
**Anuja Pimplapure**  
Microbiology



**Kassidy Robinson**  
Genetics



**John Witherspoon**  
GG Scholars  
First Year



**Zach Zagon**  
Genetics



**Noor Zamamiri**  
Genetics

**Title: Multiplex CRISPR editing of wood for sustainable fiber production**

**Journal: *Science*. 381(6654):216-221**

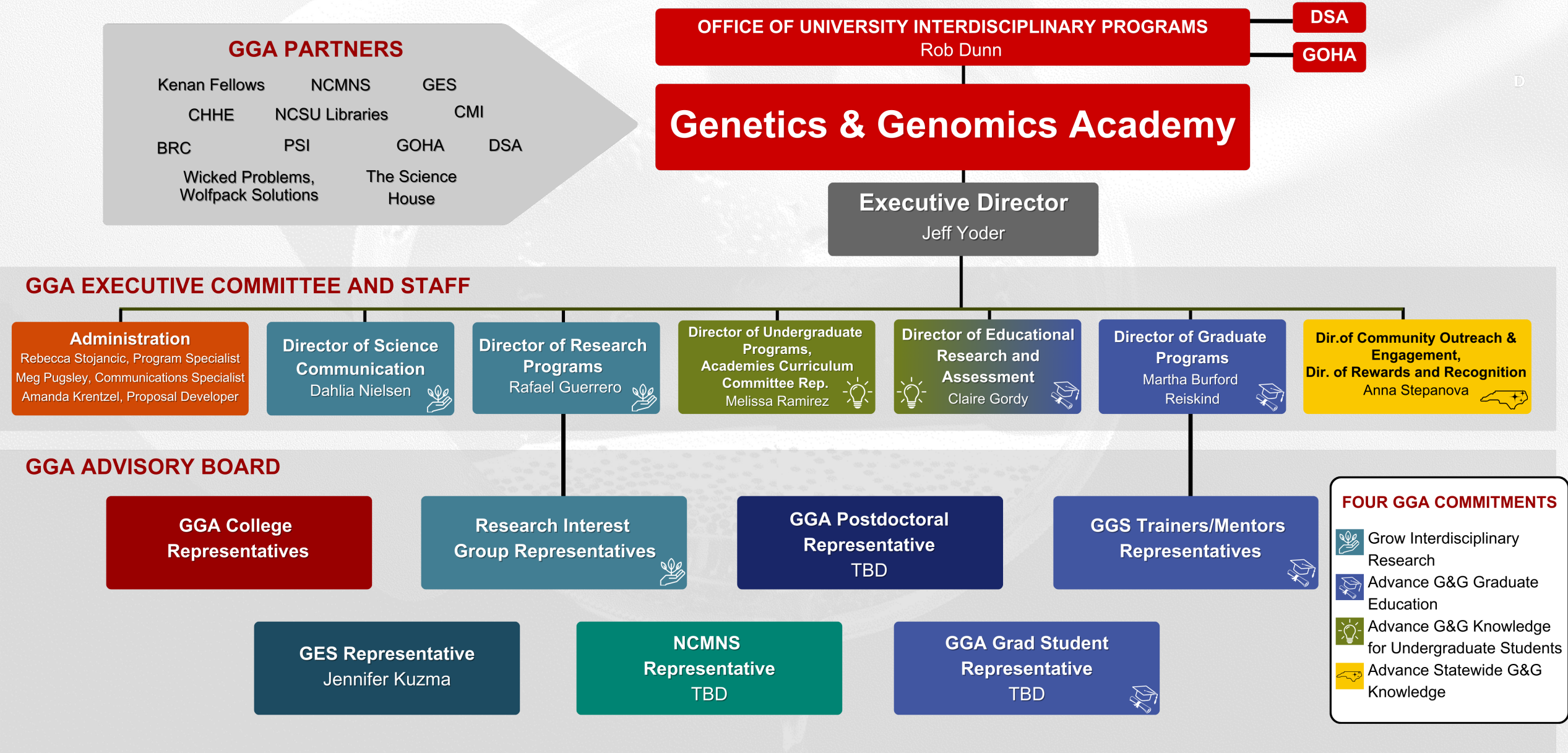
Sulis DB, Jiang X, Yang C, Marques BM, Matthews ML, Miller Z, Lan K, Cofre-Vega C, Liu B, Sun R, Sederoff H, Bing RG, Sun X, Williams CM, Jameel H, Phillips R, Chang HM, Peszlen I, Huang YY, Li W, Kelly RM, Sederoff RR, Chiang VL, Barrangou R, Wang JP. (2023). Multiplex CRISPR editing of wood for sustainable fiber production. DOI:10.1126/science.add4514

## Abstract

The domestication of forest trees for a more sustainable fiber bioeconomy has long been hindered by the complexity and plasticity of lignin, a biopolymer in wood that is recalcitrant to chemical and enzymatic degradation. Here, we show that multiplex CRISPR editing enables precise woody feedstock design for combinatorial improvement of lignin composition and wood properties. By assessing every possible combination of 69,123 multigenic editing strategies for 21 lignin biosynthesis genes, we deduced seven different genome editing strategies targeting the concurrent alteration of up to six genes and produced 174 edited poplar variants. CRISPR editing increased the wood carbohydrate-to-lignin ratio up to 228% that of wild type, leading to more-efficient fiber pulping. The edited wood alleviates a major fiber-production bottleneck regardless of changes in tree growth rate and could bring unprecedented operational efficiencies, bioeconomic opportunities, and environmental benefits.



# Admin Flowchart



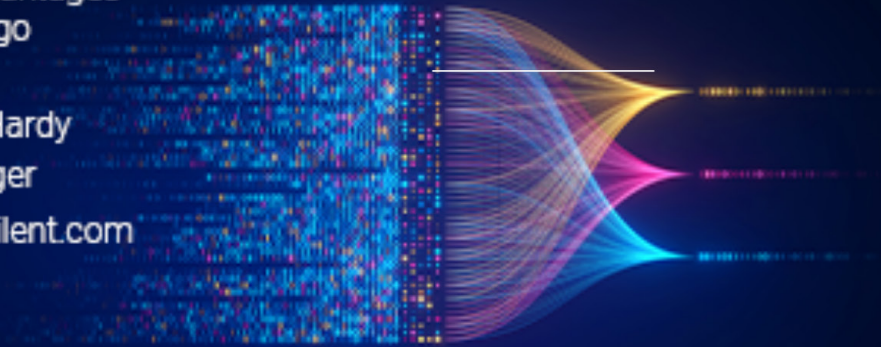
## Agilent SurePrint Oligo Pools

Exceptional uniformity and fidelity

### Custom high resolution, massively parallel DNA synthesis

Explore the advantages  
of SurePrint Oligo  
Pools today.

Contact: Sara Hardy  
Account Manager  
[sara.hardy@agilent.com](mailto:sara.hardy@agilent.com)



PR7001-255

## QIAcuity® Digital PCR System

Fast. Scalable. Reliable.



Sample to Insight

[Jeremy.sanders@qiagen.com](mailto:Jeremy.sanders@qiagen.com)  
919.412.6833

## More capacity More flexibility More to discover

The NextSeq™ 1000 and 2000 enable 3x the sequencing capacity at 1/2 the cost\*, making them the ideal platforms for helping you do more with multiomics.

\*compared with the NextSeq™ 500/550 platforms.



See it for yourself.  
[illumina.com/nextseq2000](https://illumina.com/nextseq2000)



For Research Use Only. Not for use in diagnostic procedures.

M-GL-00344

## PacBio

### SHAPING THE FUTURE OF SEQUENCING TOGETHER



Revio™

Onso™

**CONTACT US: [PACB.COM/CONTACT](https://pacb.com/contact)**

Research use only. Not for use in diagnostic procedures. © 2024 PacBio. All rights reserved.

# SUPERCHARGE YOUR DISCOVERIES WITH ULTRA-RICH SEQUENCING DATA



Oxford Nanopore Technologies and the Wheel icon are registered trademarks of Oxford Nanopore Technologies plc in various countries. © 2024 Oxford Nanopore Technologies plc. All rights reserved. Oxford Nanopore Technologies products are not intended for use for health assessment or to diagnose, treat, mitigate, cure, or prevent any disease or condition.

WHAT YOU'RE  
MISSING  
MATTERS



From fusions to full-length transcript isoforms, methylation to complex copy number variations, nanopore technology helps you reveal powerful information about underlying causes of disease.

## JMP Pro for Omics and AI

### AI Integration

- Leverage advanced AI capabilities for text, image, and tabular data using state-of-the-art tools: **Torch & XGBoost.**

### Analysis & Visualization

- Seamlessly import various omics data
- Perform quality control & normalization.
- Build basic to advanced modeling with ease.
- Engage with interactive visualizations to uncover insights and trends.

### User-Friendly Features

- No programming or coding required – finish analysis with mouse clicks.
- Recordable workflows for reusable, customized analyses.
- Customizable and shareable templates for reports and figures.

### Support & Accessibility

- **FREE access** to software, training, and tech support through **NCSU.**



Copyright © JMP Statistical Discovery LLC. All rights reserved.

## Campus Partners



**NC STATE UNIVERSITY**

### Kelly Sides

*Asst Director, Plant Genotyping Facility*  
919.513.2012  
kafridey@ncsu.edu

**NC STATE UNIVERSITY**

MicroFACS Facility

### Ryan Paerl

rpaerl@ncsu.edu

**NC STATE UNIVERSITY**

Cellular and Molecular Imaging Facility

### Mariusz Zareba

mpzareba@ncsu.edu

**NC STATE UNIVERSITY**

Proposal Development Unit



### Amanda Krentzel

*Proposal Developer*  
aakrentz@ncsu.edu

"I work with GGA members on finding, developing, and improving their competitive research/education/outreach proposals. Please contact me to schedule a consultation or request services for proposal development support."

# Thank you to our Sponsors

**PacBio**  
**mirxes**

**illumina**

 **Oxford**  
**NANOPORE**<sup>™</sup>  
Technologies



**Agilent**

**jmp** *STATISTICAL  
DISCOVERY*



**QIAGEN**

**PacBio - Niki Newell**

Territory Account Manager  
650.353.8827  
nnewell.pacb.com

**Mirxes - Jason Howard**

Field Application Scientist  
919.599.8616  
jasonhoward@mirxes.com

**Illumina - Matt Sergent**

Senior Territory Account Manager  
619.672.5325  
msergent@illumina.com

**Oxford Nanopore - Stuart Anderson**

Account Executive  
425.894.6204  
stuart.anderson@nanoporetech.com

**Agilent - Sara Hardy**

Account Manager NC & SC  
919.208.7816  
sara.hardy@agilent.com

**JMP Genomics - Chuck London**

Senior Academic Program Manager  
919.531.3049  
chuck.london@jmp.com

**Jeremy Vann Sanders**

Senior Customer Solutions  
Manager-North Carolina  
919.412.6833  
jeremy.sanders@qiagen.com